PALLIATIVE MEDICINE COMPETENCY EDUCATION IN EMERGENCY MEDICINE RESIDENCY TRAINING: A SURVEY OF EMERGENCY MEDICINE EDUCATION LEADERS

By

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A dissertation submitted to the Johns Hopkins University, Bloomberg School of Public Health in conformity with the requirements for the degree of Doctor of Public Health

Baltimore, Maryland

May 2014

ABSTRACT

Background: Emergency physicians care for patients with palliative and hospice needs. More than 75 percent of patients visit the ED in the last 6 months of life, and two-thirds of those patients die while hospitalized.

Objectives: To assess hospice and palliative medicine (HPM) instruction in EM residency programs and to identify barriers and opportunities for integrating instruction in HPM into EM training.

Methods: IRB-approved, cross-sectional, mixed-mode survey (web-based and paper-based) of EM residency program directors (PDs), associate PDs (APDs), and assistant PDs (aPDs) distributed to 402 subjects. Demographic variables and institutional characteristics were collected. A five-point Likert scale (1=least, 5=most) assessed Four Domains: 1 - Importance of HPM competency for senior EM residents; 2 - Senior resident skill level in HPM competencies; 3 - Effectiveness of educational methods for HPM training; and 4 - Barriers to training.

Results: There was a 50 percent response rate, a 60/40 percent distribution between paper and web-based modes, and no statistical differences in demographics between groups. Most respondents identified HPM training as important and teach HPM in their programs. In Domain 1, crucial conversations (mean 4.88, SD 0.40), management of pain (4.77, 0.53), and management of the imminently dying (4.74, 0.53) had the highest mean Likert scores for importance. In Domain 2, residents were reported to be skilled in crucial

conversations (4.28, 0.66), management of pain (4.17, 0.72), and management of the imminently dying (3.91, 0.88). In Domain 3, bedside teaching (4.53, 0.81), mentoring from HPM faculty (4.11, 0.97), and case-based simulation were identified as the most effective educational methods. In Domain 4, lack of HPM expertise among faculty (3.57,1.21), lack of faculty (3.42, 1.20) and resident interest in HPM (3.04, 1.20) were identified as the greatest barriers. Six competencies (withholding/withdrawal of non-beneficial interventions, management of imminently dying, HPM referrals, ethical/legal issues, spiritual/cultural issues, management of dying child) showed large differences between perceived importance and reported senior resident skill level.

Conclusions: This study is the first comprehensive description of HPM competency training in EM residencies. The results provide a foundation for focused educational interventions and future research to improve HPM training for EM residents.

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FUNDING SOURCES

The research presented in this report received funding from the following:

- The Emergency Medicine Foundation (EMF) and Emergency Medicine Residents' Association (EMRA) Resident Research Grant, Dallas TX ($5,000) - 2013-14

- The Philadelphia College of Osteopathic Medicine (PCOM) MedNET Grant Program, Philadelphia PA ($2,500) - 2013-14

- The Dorothy Rider Pool Healthcare Trust, Lehigh Valley Health Network, Allentown, PA ($25,000) - 2012-14

ACKNOWLEDGEMENTS

Words are inadequate to convey my appreciation and gratitude to the countless individuals who have shaped me personally and professionally. There is too little space to mention all of you here, you know who you are. To my Thesis Committee and especially to my Thesis Advisor, Sydney Dy, thank you for your steadfast encouragement, timely advice, and enduring patience throughout this arduous process. To the many mentors who have guided me during my time at the Bloomberg School of Public Health: Edyth Schoenrich, Bob Lawrence, Laura Morlock, Lilly Engineer: thank you for convincing me that the goal was closer than I imagined and for challenging me to turn the seemingly impossible into an accomplishment. To Dan Ray, thank you for introducing me to palliative care through your example as a compassionate and caring physician. To my first mentors in emergency medicine, Judy Shahan, Rich Rothman, and Gabe Kelen, your openness to my learning sparked my interest in pursuing meaningful questions.

Last but not least, I wish to thank my family and friends; I dedicate this work and any successes that I have enjoyed or will enjoy in the future to you. To my parents, Eugene and Monica, your unwavering love and selfless support for me live on in your spirits. To my sisters, Vanessa and Lynette, and to my brothers, Damian and Bradley, your example has inspired your baby brother to excellence in my endeavors. To my nieces and nephews whose companionship I cherish. To Kristin, thank you for always being the partner at my side, for enduring countless and significant sacrifices, and for encouraging me to pursue my passions. To my sons, Stewart and Sebastian, you are life's greatest blessings, and daily give joy to my heart, a smile to my face, and are a reminder of how blessed I am. Thank you.

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ABBREVIATIONS

AAEM – The American Academy of Emergency Medicine
ABMS – The American Board of Medical Specialties
ACEP – The American College of Emergency Physicians
ACGME – Accreditation Council on Graduate Medical Education
ACOEP – American College of Osteopathic Emergency Physicians
AOA – American Osteopathic Association
APD – Associate Program Director
aPD – Assistant Program Director
CDC – The Centers for Disease Control and Prevention
CORD – The Council of Residency Directors in Emergency Medicine
ED – Emergency Department
EMRA – The Emergency Medicine Residents' Association
EM – Emergency Medicine
EPEC-EM – Education in Palliative and End-of-Life Care for Emergency Medicine
HPM – Hospice and Palliative Medicine
IPAL-EM – Improving Palliative
JHSPH – Johns Hopkins Bloomberg School of Public Health
LVHN – Lehigh Valley Health Network
PD – Program Director
RAND – The RAND Corporation
SAEM – Society for Academic Emergency Medicine
WHO – World Health Organization

The good physician treats the disease. The great physician treats the patient with the disease.

Sir William Osler

I HISTORICAL CONTEXTS

Chapter Summary Statement

This chapter summarizes the development of hospice and palliative medicine (HPM) and emergency medicine (EM) as distinct medical specialties that developed over the past 40 years and the intersection of the two specialties today.

1.1 Hospice and Palliative Medicine, An Historical Context

Palliative care is defined by the World Health Organization (WHO) as the medical specialty that "improves the quality of life of patients and their families facing the problems associated with life-threatening illness, through the prevention and relief of suffering by means of early identification and impeccable assessment and treatment of pain and other problems, physical, psychosocial, and spiritual."[1] The goal of palliative care is "to improve quality of life for both the patient and the family."[2] Hospice care is distinct from, yet closely related to, palliative care. Often the two services are provided as part of a continuum of care, with palliative care being provided until the patient reaches the final few months of life when hospice care begins. The distinction between hospice and palliative care services are highlighted by eligibility criteria and reimbursement for those services as defined by the Center for Medicare and Medicaid Services (CMS). Hospice is defined by CMS as care for individuals with terminal illness whose life expectancy is less than six months.[3]

Hospice and Palliative Medicine (HPM) is a new medical specialty, gaining formal recognition in 2006. The development of the field traces its roots and development back several centuries. Hospice "can be traced back to medieval times when it referred to a place of shelter and rest for weary or ill travelers on a long journey."[4] The first homes established for the terminally ill were established as early as the 11th through 14th centuries by religious groups.[5-7] Hospices were well established in the late 19th century by the Irish Sisters of Charity in Dublin, Ireland. Dame Cicely Saunders, a British physician who is widely considered to be the founder of the modern hospice and palliative care movement, introduced the concept of hospice in the U.S. during a 1963 lecture at Yale University. This lecture was followed by the book, *On Death and Dying*, by Elisabeth Kubler-Ross that introduced the five stages of grief, that are now widely used to understand human grief.[8] The first hospice in the U.S. opened in 1974 in New Haven, Connecticut.[9]

From these humble roots, HPM today is a rapidly growing and expanding field in the house of medicine. Currently two-thirds of all hospitals and more than 85 percent of all mid to large hospitals in the US have a palliative care team.[10] In September 2006, Hospice and Palliative Medicine (HPM) was approved as a subspecialty by the American Board of Medical Specialties (ABMS), with ten specialties co-sponsoring certification: The American Boards of Internal Medicine, Anesthesiology, Family Medicine, Physical Medicine and Rehabilitation, Psychiatry and Neurology, Surgery, Pediatrics, Emergency Medicine, Radiology, and Obstetrics and Gynecology.[11] The recognition of HPM as a

distinct subspecialty was the culmination of at least a decade of discussion and work acknowledging the need for a trained workforce in HPM.[12]

1.2 Emergency Medicine, A Historical Context

In the early 1960s, the U.S. public began to demand improvements in the care provided in hospital emergency departments (EDs). This demand was fueled by the growing number of specialist physicians, technology and modernization in health care, and an increasingly mobile population.[13] These societal and healthcare forces led to the emergence of training programs in emergency medicine (EM) in the early 1970s, before the specialty was formally acknowledged in the house of medicine. In September 1979, EM became the 23rd specialty recognized by the American Board of Medical Specialties (ABMS).

In the almost four decades since EM became a recognized specialty by the ABMS, the field has grown from primarily providing care for acutely ill and injured patients who require timely resuscitation and stabilization to serving as the hub of the health care system. Now, in addition to expertise in acute resuscitation, emergency physicians also provide unscheduled care for patients who require the management of complex, chronic conditions such as chronic obstructive pulmonary disease, congestive heart failure, and HIV/AIDS. According to a recent RAND report on the evolution of emergency medicine in the healthcare system, "The highly specialized knowledge and skills emergency physicians possess have allowed hospital EDs to dramatically expand their capability to

diagnose and manage a wide range of problems, from resuscitating critically ill and injured children and adults to managing complex patients with chronic diseases such as HIV-AIDS, cancer, renal failure, and diabetes."[14] The RAND report also notes that, "office-based physicians increasingly rely on EDs to evaluate complex patients with potentially serious problems, rather than managing these patients themselves … emergency physicians are increasingly serving as the major decision-maker for approximately half of all hospital admissions in the United States."[14]

1.3 Public Health Context

The parallel development of HPM and EM as recognized medical specialties is more than historically intriguing. As the emergency department has become a hub of the healthcare system for patients with chronic, complex, and terminal illnesses, the need to address palliative and hospice needs in this population has come to the forefront.

The growth of diagnostic technology, therapeutic interventions, and pharmacologic advances has extended life expectancy for patients with complex and terminal illnesses. At the same time, the U.S. population is aging. The CDC estimates that by 2030 Americans aged 65 years and older will make up for 20 percent of the population and account for more than two-thirds of all health care spending.[15] ED's account for more than half of admissions to U.S. hospitals, and admissions account for nearly one-third of total healthcare costs.[14,16,17] Additionally, an estimated 700,000 people die annually in the emergency department or during the subsequent hospitalization after inpatient

admission from the ED.[18] A recent study showed that more than 75 percent of patients visit the ED in the last six months of life, and more than two-thirds of those patients die while hospitalized.[19] Patients with chronic and terminal illnesses present to the ED with complex psychosocial needs, often with limited support systems, and are facing the possibility of imminent death.[20,21] As a first contact for these patients, emergency physicians provide palliative care in their daily practice. Emergency physicians initiate invasive life-sustaining treatments and make decisions that determine patient dispositions to critical care units in the hospitals, making the ED an important context in which to address patients' palliative needs.[22,23]

Over the past several years, discussions of health care reform have focused on the transition from utilization of inpatient, hospital-based resources toward a value-based, continuum of care model that integrates all parts of a patient's care in the most cost-efficient way possible. A significant portion of Medicare spending on healthcare occurs in the final few months of an individual's life. One estimate of Medicare spending in 2011 reveals that approximately 28 percent or $170 billion was spent in a patient's last six months of life.[24] In addition to the considerable public costs to end-of-life healthcare expenditures, there is a marked toll on the economic well-being of individuals as a result of this spending. A recent study suggested that on average, elderly Medicare beneficiaries spend more than $51,000 in out-of-pocket expenditures on healthcare after one spouse in a couple dies.[25]

Hospice and palliative care services can play a role in fundamentally changing these macroeconomic realities. The delivery of appropriate palliative and hospice services provides improved patient and family satisfaction, decreased cost, higher quality, and increased survival.[26-28] Despite this evidence and the availability of HPM services, the use of palliative services remains low. Instead, there is a tendency for physicians to "perceive palliative care as the alternative to life-prolonging or curative care – what we do when there is nothing more that we can do – rather than as a simultaneously delivered adjunct to disease-focused treatment."[29-30] In hospitals where palliative care services are used, there is lower overall Medicare spending per enrollee, fewer Medicare in-hospital deaths, and fewer ICU admissions during terminal hospitalizations (i.e. those hospitalizations during which an individual dies).[31] There is also growing evidence that direct ED to hospice admissions can offer significant cost savings and improvements in quality of care.[32-34]

The ED, and specifically emergency physicians, can be the hub of HPM delivery for patients with known or new palliative and hospice needs. Connecting ED patients with palliative care needs to those services can increase quality of care at a reduced cost because of potential changes in the trajectory of a patient's care and away from ICU admissions and with decreased length of stay as an inpatient.[16,35-37]

1.4 Conclusions

At first glance, the delivery of hospice and palliative care services in the ED might seem at odds with the emergency physician's training; training that is focused on rapid action and intervention to halt threats to life and limb. However, there is a growing body of evidence that the ED is an appropriate setting for palliative medicine.[38] Emergency physicians need to possess a unique set of HPM skills, including the knowledge of pain and symptom management at the end of life, the ability to deliver bad news, and the compassion to help patients and family members trying to cope with urgent and difficult treatment decisions.[39,40] Emergency physicians also routinely rely on many of the same skills that are refined and advanced by palliative medicine teams when treating symptoms, facilitating goals of care discussions, communicating bad news, and the treatment of the physical, psychological, and social suffering in patient care.[21] These generalist palliative care skills can help to identify and respect the patient's goals of care prior to initiating a diagnostic and therapeutic trajectory.[41-43]

Palliative care offers a patient-centered approach, intended to meet the needs of chronically and terminally ill patients who present to the ED.[44] Models for developing and incorporating end-of-life and palliative care into non-ED critical care settings already exist.[45,46] When initiated in the ED, palliative care can be directed toward treating and preventing exacerbations of chronic conditions, beginning appropriate symptom management, finding appropriate community resources, eliciting patient and family preferences, and preparing families of patients with life limiting illnesses for future

possible visits to the ED.[47] The integration of palliative medicine into ED care enhances the patient-centered practice of EM.[48] The most notable national initiative for improving palliative care in the ED is the Improving Palliative Care in Emergency Medicine (IPAL-EM), sponsored by the Olive Branch Foundation and the Center to Advance Palliative Care (CAPC).

There are multiple challenges to providing quality palliative care in the ED. These include pressures to quickly and appropriately disposition patients to inpatient beds or home, large patient volumes, a potential lack of ability for patients with critical or terminal illnesses to make informed decisions about their care, providers' lack of training in palliative and end-of-life issues, and the lack of an established, on-going patient-physician relationship between the emergency physician and the patient or their family.[49-54] Among these challenges, education of emergency physicians and staff in palliative medicine is a variable that can be impacted by focused intervention, especially at the level of residency training. Formal training in palliative medicine has been identified by emergency physicians as one solution to the functional challenges of delivering palliative care in the ED.[38]

The objective of this study is to provide a descriptive analysis of the current state of hospice and palliative medicine competency education in emergency medicine residencies in the United States from the perspective of residency program leaders, including program directors (PDs), associate program directors (APDs), and assistant

program directors (aPDs). The research presented in this report provides a descriptive overview of the current state of hospice and palliative medicine (HPM) competency education in emergency medicine residency and discusses areas for future research and policy initiatives in HPM education in EM training. The ED and its providers have a tremendous influence on the entire healthcare system, particularly with regard to promoting palliative care access.[55]

II GOALS AND OBJECTIVES

Chapter Summary Statement

This chapter summarizes the current state of HPM education and describes the study's goals and objectives.

2.1 HPM Education in Emergency Medicine

Hospice and palliative care are core competencies of the emergency physician as outlined in the Model of the Clinical Practice of Emergency Medicine, the document that defines the knowledge, skills, and abilities required for board certification in EM.[56]. A large number of patients with chronic, complex illnesses and terminal and life-limiting conditions present to the emergency department during acute crises. The American College of Emergency Physicians (ACEP) recently included early palliative and hospice care referrals from the ED as one of five priority items in its "Choosing Wisely" recommendations.[1] ACEP recommends, "Don't delay engaging available palliative and hospice care services in the emergency department for patients likely to benefit."[57] ACEP has also identified "Medical Education" as a focus area for the ED community with regard to palliative care in the ED. Included in this focus area are topics such as: EM core curriculum which includes end-of-life care, EM core competencies for EM residents with respect to older adults and palliative care, and competency assessment across

[1] Choosing Wisely® is an initiative of the American Board of Internal Medicine (ABIM) Foundation that is intended to encourage conversations between patients, physicians, and other healthcare stakeholders regarding costly and potentially unnecessary tests and procedures. See www.choosingwisely.org.

disciplines.[58] The development of a clearer definition of the educational needs of EM trainees is a research priority in palliative emergency medicine.[59] This study directly addresses that priority.

Although there is the availability of fellowship training in HPM for EM residency-trained physicians, the reality is that only a small number of EM residents will pursue fellowship training. Additionally, there is unlikely to be an adequate number of HPM specialists anytime in the near future, making it necessary for physicians in all specialties to have a basic set of "primary" palliative medicine skills.[43] Therefore, it is critically important to integrate HPM principles into EM residency training. Beemath and Zalenski assert that, "Fear and lack of insight into the dying process, poor communication with patient/family, and discomfort in using opioids in addressing symptom relief underlie the need for integrating palliative medicine into the teaching curricula of residents."[60]

The study presented herein is novel because no previous authors have performed a national needs assessment of HPM skills in EM residency curriculum. There have been surveys of residents and faculty that have attempted to evaluate HPM education in EM residency training, but these studies had small sample sizes and were not nationally representative.[61] This study adds to the existing knowledge base of the EM/HPM literature because it provides a national perspective of those educational leaders who are responsible for preparing residents for board certification in EM. Program directors (PDs) and the associate (APDs) and assistant (aPDs) with whom they work are the primary

faculty at EM residency programs who ensure that residents are prepared with the core foundation of knowledge and competencies required for the passage of the EM certification process (i.e. Board Certification). These same faculty make the final determination that EM residents are adequately trained to engage in the independent practice of emergency medicine.

The Accreditation Council for Graduate Medical Education (ACGME) has defined six general core competencies used to evaluate the progress of resident physicians across all medical specialties: patient care, medical knowledge, practice-based learning and improvement, interpersonal and communication skills, professionalism, systems-based practice professionalism, and systems-based practice.[62] These core competencies provide the framework for EM residency training and are further developed in the Model of the Clinical Practice of Emergency Medicine, the document that outlines the knowledge and skills foundation requisite to being board certified in EM.[56]

The Model of the Clinical Practice of EM includes palliative medicine competencies as a core skill for the board-certified emergency physician.[56] Within the Model, palliative medicine competencies for EM residency trainees are included within the systems-based practice competency, one of the six core competencies of residency training as defined by the Accreditation Committee for Graduate Medical Education (ACGME). However, instruction in palliative care competencies is not currently a formal part of EM residency

training curriculums, nor have EM educators "comprehensively defined or embraced a core palliative medicine skill set for emergency providers."[59]

The training and preparation for resident physicians to care for patients with terminal illness and those conditions requiring end-of-life care has been reported to be inadequate across specialties, not just in emergency medicine. An analysis of 46 specialties in post-graduate residency training by the Accreditation Committee on Graduate Medical Education (ACGME) noted a lack of comprehensive palliative and end-of-life training requirements among programs and suggested that residency review committees make these competencies a coherent part of specialty-specific post-graduate training.[63] Training residents "to be aware of and to evaluate the patient's understanding (of death and dying) and to teach residents how to deliver bad news" are skills that are as important as mastering the technical aspects of being a physician.[64]

Several solutions have been proposed and evaluated for improving HPM education among resident physicians in a number of specialties. For example, an analysis of a case-based palliative care workshop developed for general surgery residents has been shown to improve the knowledge and perception of palliative care among residents.[65] Among internal medicine residents, a classroom intervention did not improve palliative care knowledge and attitudes[66] but a web-based learning program for knowledge acquisition combined with bedside clinical competency evaluation of internal medicine residents by attending clinical faculty was effective.[67] Among pediatric residents, a discussion-

based seminar series was found to be a successful method for increasing confidence in providing care for seriously ill and dying children.[68] Similarly, a formal curriculum the Pediatric Palliative Care Curriculum (PPCC), consisting of six, one-hour sessions, enhanced pediatric residents' confidence in caring for dying children and their families.[69] These examples from other specialties provide a potential framework for HPM education in EM residency training.

In addition to the palliative care education examples in other specialties, there exists a training curriculum for HPM competencies for EM providers. The Education in Palliative and End-of-life Care for Emergency Medicine (EPEC®-EM) is a NIH-funded project created in 2007 to "teach the essential clinical competencies in palliative care to professionals who work in the emergency department."[39] EPEC®-EM is a formal, validated curriculum designed by a national panel of experts in EM, HPM, geriatrics, and oncology. The EPEC®-EM curriculum is comprised of 14 learning modules that encompass the core domains of knowledge and competence in emergency palliative care. Dissemination of course materials occurs through the "Become an EPEC®-EM Trainer" conference during which participants learn the course material and receive instructional methods for teaching the course at their home institutions. Completion of the entire course takes approximately 16 hours and can be modified to meet the needs of learners at the trainer's local institution. Pre- and post-instruction examinations measure participants' knowledge.[39]

There are approximately 50 EM residency programs that have EPEC®-EM trainers who have completed the curriculum.[39] At least one EM residency program has adapted the EPEC®-EM course materials for instruction at the program level. Gisondi and colleagues applied the EPEC®-EM curriculum within an EM residency using both asynchronous and synchronous learning[2] modules, with improved post-test knowledge demonstration in all EPEC®-EM domains.[70] Although promising, this study is limited in its scope because it used the EPEC®-EM curriculum in a single EM residency program.

Despite the existence of EPEC®-EM, the HPM competencies that it teaches have not been widely disseminated to EM residents. For example, a recently published survey that focused on a small convenience sample of EM residents in New York City suggests that although residents perceive HPM skills as important and want additional training in palliative care, there is a general lack of formal training in EM residency programs.[71] EM residents remain a "population of learners thought to be uniform in their lack of didactic and clinical exposure to core cognitive domains of emergency palliative care."[70] This study will help to further define the gaps in HPM competency training in EM residency programs and provide a foundation to engage stakeholders to improve these competencies through directed educational and/or policy interventions.

[2] Asynchronous learning is delivered in a student-centered way outside of the constraints of space and time (e.g. online course with lectures completed at student determined times), while synchronous learning is more traditional, with material delivered in-person or at a pre-determined time or place (e.g. lecture-based didactic sessions).

2.2 Assumptions

Several a priori assumptions are made in this study. First, the scientific foundation of palliative medicine education in EM is in its early stages. Therefore, based on the available literature, it is presumed that a majority of EM residency programs do not have curriculum components dedicated to HPM competencies. Secondly, there is likely to be some agreement among EM education leaders regarding the challenges to providing HPM training in EM residency curriculums. Finally, it is assumed that there are specific characteristics of individual education leaders and their institutions that are associated with palliative medicine training as a part of the EM residency curriculum. Some potential characteristics might be geographical region of the U.S., type of hospital (e.g. academic versus community), or presence of HPM service in the institution.

There are several core competencies of HPM that are likely to receive less focus during EM residency training. For example, management of the dying child and advance care planning are skills that might be less likely to be learned in EM residency because of the daily demands and experiences of clinical practice in an ED. Based on the nature of the acuity level of many patients presenting to the ED, EM residents are exposed to certain skills and competencies of HPM as part of their daily work. These might include crucial conversations, prognostication of illness trajectory, and management of pain.

2.3 Study Goals and Objectives

In order to investigate the primary topic of HPM competency education in EM residency training, the following are the study's goals and objectives.

The goals of this study are to:

1. Describe the current state of palliative medicine competency education and instruction in EM; and,
2. Describe current practices and future opportunities for education of EM residents in HPM competencies.

The objectives of this study are to:

1. Describe HPM training in EM programs;
2. Describe *Four Domains* of HPM training in EM programs:
    a. Importance of specific HPM competencies for senior EM residents
    b. Senior resident skill level in specific HPM competencies
    c. Effectiveness of different educational methods for HPM training
    d. Barriers to HPM training
3. Investigate whether specific program, institution, and education leaders' characteristics are associated HPM competency training in EM.

In order to accomplish these objectives, the following questions will be addressed by the analysis of survey responses:

- What, if any, variables are associated with HPM competency training in EM residency programs?
- What, if any, are the barriers to HPM competency training in EM residency programs?

- What, if any, are the best practices or commonly used models for HPM competency training in EM residency programs?

The data collected and survey questions were written to address these specific goals and objectives as described in the following chapters.

III STUDY DESIGN

Chapter Summary Statement

The study is a cross-sectional, mixed-mode survey (web-based and paper-based) of EM residency education leaders in the United States.

3.1 Study population

Program directors (PDs), associate program directors (APDs), and assistant program directors (aPDs) from EM residency programs in the United States are the study population. The study population of interest included these leaders from all EM programs accredited by the American Osteopathic Association (AOA/D.O.) and the Accreditation Committee on Graduate Medical Education (ACGME/M.D.) accredited EM residency programs. At the time that the study commenced, there were 45 AOA/D.O. and 155 ACGME/M.D. EM residency programs. Five of the 200 programs are accredited by both the AOA and the ACGME.

EM residents or practicing emergency physicians are groups who need to have HPM skills. Residency PDs, APDs, and aPDs shape EM residency training curriculum. PDs, APDs, and aPDs are an appropriate population to sample because they are charged with training and preparing emergency physicians to master the competencies necessary for board certification in the specialty. This group is responsible for certifying that EM trainees have met the qualifications to be eligible to sit for board certification exams. This is also a captive audience to approach for answering questions about how HPM

competencies can be best implemented into existing residency curriculum. PDs, APDs, and aPDs can accurately describe curriculum needs in EM.

There is no a priori reason to believe that PDs will differ from APDs or aPDs in their opinions about HPM competency training in EM programs. However, by surveying these distinct groups, comparisons can be made between these groups of educators to discern if there are differences. Additionally, many APDs and aPDs ultimately transition into the PD role either at their current institution or at another institution. Therefore, the responses of APDs and aPDs might provide insights into future trends in EM education.

3.2 Identification of Study Population

EM residency programs are not identical in the composition of their residency leadership or in training length (i.e. there are both PGY 1-3 and PGY 1-4 programs). Each residency program has a slightly different educational leadership structure, although a majority of programs have at minimum, a PD, and either an APD or aPD. Some smaller programs have only a PD. Other programs have a PD and multiple APDs and/or aPDs. These characteristics are largely based on the program's size, local resource needs and availability, and affiliated medical school policies.

During the study design phase, there was discussion with the Council of Residency Directors in Emergency Medicine (CORD) leadership about the use of the CORD

electronic list-serve to distribute the survey. The CORD list-serve is used for communications among education leaders in EM, including PDs, APDs, and aPDs. It also includes a variety of other stakeholders in EM residency education, such as program coordinators, medical student clerkship directors, and in limited cases, other academic leaders such as designated institutional officers or Deans. The list-serve does not have the capability to sort by academic position (e.g. PD, clerkship directors, etc…) so the CORD leadership recommended against using the list-serve for survey distribution because of the concern that responses from individuals other than PDs, APDs, aPDs would skew results of the study.

PDs, APDs, and aPDs were identified and verified through several strategies. First, a structured search of the ACGME and AOA websites for accredited EM programs was completed.[72,73] These websites provide a list of PDs and their contact information (email/mailing address, phone number, etc…) for all accredited allopathic and osteopathic residencies in the U.S. However, they do not provide any information on the APDs or aPDs. The names and contact information for APDs and aPDs were obtained by searching the websites of individual residency programs and by reviewing residency information maintained on the websites of the following professional societies and organizations in EM: the Society for Academic Emergency Medicine (SAEM),[74] the Emergency Medicine Residents' Association (EMRA),[75] the American College of Emergency Physicians (ACEP),[76] the Council of Residency Directors in Emergency

Medicine (CORD),[77] the American Academy of Emergency Medicine (AAEM),[78] and the American College of Osteopathic Emergency Physicians (ACOEP).[79]

After reviewing these resources, and in cases where the names and contact info for PDs, APDs, and aPDs was not found, an individual email was sent to the program coordinator, who serves as the primary administrative staff for an EM residency program. After these emails, follow-up phone calls were made to the program coordinators for any remaining programs where the PD, APD, or aPD could not otherwise be verified. These exhaustive efforts to identify all emergency medicine PDs, APDs, and aPDs resulted in a list of 402 potential study subjects.

There was no power calculation for determining the sample size because this is a descriptive study and the entire population of interest was invited to participate.

3.3 Protection of Human Subjects and Ethical Considerations

The study met criteria to be considered exempt by the IRBs at both the Johns Hopkins Bloomberg School of Public Health (JHSPH) and the Lehigh Valley Health Network (LVHN). Participation in the study was voluntary. Participants were informed of their right not to participate in the introductory materials provided in the survey distribution. Completing the survey represented subjects' consent for participation. The survey was essentially an opinion poll, and therefore represented no more than minimal risk to study

subjects, that is, no more than usually encountered in daily life or during routine physical or psychological testing. In order for the survey to be granted exempt status from the IRB, it was required that subjects could not be identified, and so surveys were sent anonymously. This creates the limitation of not having a comparison group.

Following IRB approval, surveys were distributed using three methods described below. Because EM residency programs represent a relatively small community, the data collected through surveys cannot guarantee total anonymity. Individual and institutional demographic characteristics were collected and because of the small number of EM programs, respondents could conceivably be identified with effort. However, focused efforts were made to protect the identities of individual respondents, and the study question content is of minimal risk, so if any respondents were to be individually identified, there is still no more than minimal risk.

3.4 Selection of Survey as Study Instrument

A survey was selected as the methodology of choice because of practical considerations of feasible access to the study population, cost and time, and the familiarity of the study population with surveys. There are other methods that could be used such as focus groups or focused, in-person interviews with members of these same groups. However, none of these other methods has the potential to reach as much of the target population as possible and with the advantages of cost and time convenience. Also, the target

population in this study is accustomed to surveys. The CORD list-serve is frequently the venue for informal surveys that facilitate the exchange of ideas and best practices among residency educators in EM.

In addition to the practical considerations of survey research, the objectives of this study can be accomplished with survey methodology. The need to educate emergency physicians in HPM competencies is a new concept. As such, the literature regarding how to provide this education is still being developed. Therefore, it is necessary to frame the context of needs, barriers, and processes that already exist. An effective way to accomplish this is by eliciting the opinions of those professionals who design and deliver education for emergency medicine residents as a daily part of their work.

3.5 Survey design

The survey was intended for completion in approximately 15 minutes. It was structured to elicit feedback about the multiple learning methods, such as didactics, bedside teaching, simulation, etc… that are the most commonly used in EM residency training. The variables for HPM competencies were modified from EPEC®-EM and previously published HPM competencies.[23]

The questions in the survey were ordered intentionally as follows: to ask the two objective questions at the outset of the survey, followed by the Likert questions in the

Four Domains (Educational Methods, Barriers, Competencies, and Skills), followed by general demographic data. The goal was to collect as many responses as possible about the variables that were central to the goals and objectives of the study, with the understanding that some demographic variables placed near the end of the survey might have lower response rates.

The survey used both open-ended and closed-ended questions in an attempt to minimize the potential disadvantages of using one or the other type of question exclusively. Nearly every closed-ended question also had an associated area for free-text comments by the respondents. This allowed for respondents to make additional comments or to further describe and explain their answers or to clarify responses. The literature is relatively limited with regard to HPM education as compared to other topical areas in the HPM, such as pain management. Furthermore, the concept of providing focused education for EM residents in HPM competencies, and the overwhelming majority of published evidence, has only developed over approximately the past five years. In this context, the use of open-ended questions is important because it allows for the opportunity for respondents to provide free form comments and feedback that can inform this survey as well as potentially give insights into future research questions.

Open-ended questions do not limit the respondent from giving information beyond the parameters and constraints established by the researcher. Such responses can offer results that direct additional research into the topic. A major disadvantage of open-ended

questions are the challenges related to qualitative analysis, including the potential need for coding and subjective judgments by the investigator(s) regarding how to interpret and report the responses.[80]

Closed-ended questions are common in survey research and have the advantages of ease of response, ease of tabulation and analysis, and ideally, clarifying the scope and focus of the question.[80] Conversely, there are several potential disadvantages of closed-ended questions. These disadvantages include the requirement that respondents answer within the construct selected by the researchers, preventing respondents from expressing their own, "potentially more accurate, answers."[80]

The majority of the survey questions were designed for mutually exclusive responses. For example, subjects were asked to comment on the effectiveness of different methods of providing HPM competency education to residents (e.g. case-based simulation, reading list, etc…). Several questions allowed for multiple responses.

Data accuracy from survey research is highly affected by the quality of the instructions, questions, and responses. Therefore, survey design is critical to obtaining valid and reliable results. Standardization is a way to increase reliability by asking participants, "precisely the same questions in an identical format and responses recorded in a uniform manner."[81] The same survey questions and order of questions were used in both the

web-based and paper versions of the study, ensuring this standardization. The survey and its introductory materials are presented in Appendix 1.

3.6 Rationale for inclusion of variables

Inclusion criteria for variables included in the survey were based on the HPM competencies outlined by Quest and colleagues (Figure 1), the EPEC®-EM curriculum, and a review of previously published literature on the topic. In addition to the HPM competencies, multiple demographic variables were also included in the study: Gender; Academic position in the program (PD, APD, aPD); Years in position; Program Type; Program Length; US Region; Setting; Hospital Type; Number of Residents; Institution sponsored HPM; EM Resident Rotation Available; HPM Consult Available in ED; and, Familiarity with EPEC®-EM. The rationale for including these basic demographic variables was to describe the population of interest, to identify any potential predictor (independent) variables among these characteristics that would explain variability in responses to the outcomes of interest.

Figure 1: Palliative Care Skills for Emergency Physicians

Core Skills in Palliative Medicine for the Emergency Physician
Assessment of illness trajectory decline
Basic formulation of prognosis
Difficult communication/breaking bad news/death disclosure (crucial conversations)
Advance care planning
Family presence during resuscitation
Management of pain and non-pain symptoms
Withdrawal and withholding of non-beneficial treatments
Management of the imminently dying
Management of hospice patients and palliative care systems referrals
Ethical and legal issues
Spiritual and cultural competency
Management of the dying child
Adapted from Quest, et al [23]

In order to meet the goals and objectives of the study, two questions were included as outcome variables:

- "How important is it to include hospice and palliative medicine (HPM) in EM residency training curricula?" and,
- "Do you currently teach HPM competencies in your residency?"

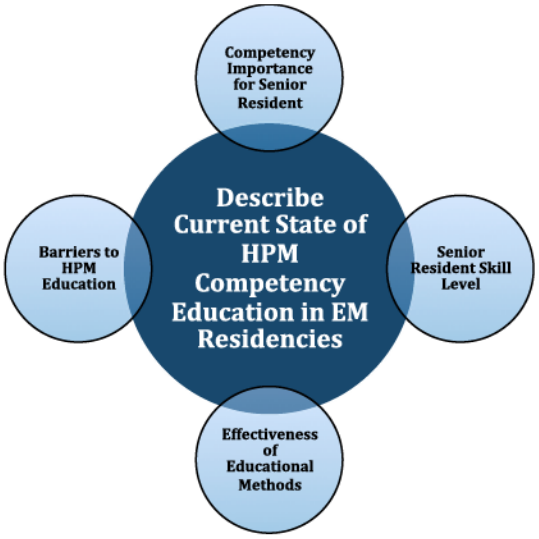
3.7 Survey Questions Related to Study Goals and Objectives

The survey is presented in Appendix 1. The questions were designed to link the variables described above with the goals and objectives of the study. Specific questions regarding instruction in HPM competencies were based on the competencies as outlined by EPEC®-EM (Figure 1), with the intention of defining the HPM skills of EM residents using an

established competency list. This approach is also expected to elicit a more detailed assessment of opportunities for improved HPM education in EM residency programs. For example, if it is clear that most PDs believe that residents are provided with adequate training in delivering bad news, but have fewer encounters with legal and ethical issues regarding terminal illnesses and end-of-life issues, these results could inform strategies for focusing educational time and resources on these areas for improvement.

In order to meet the study goals and objectives, survey questions were focused conceptually into *Four Domains*: HPM Competency Importance for Senior Resident; Barriers to HPM Education; Senior Resident Skill Level; and, Effectiveness of Educational Methods.(Figure 2) The *Domains* are proposed to capture what are, based on best available evidence, the areas where potential educational gaps exist and consequently, where educational interventions and policy measures might be targeted for the improvement of HPM competency education in EM residency training. A conceptual framework of these *Domains* is shown in Figure 2.

Figure 2: Conceptual Framework of the Four Domains



3.8 Establishing Survey Validity

No previously validated surveys on this topic exist. However, a similar study was previously distributed among pulmonary and critical care fellows and fellowship directors.[82] That survey provided a general framework for the development and layout of the survey in this report.

In the development and distribution of the survey, special consideration was given to the validation of the survey instrument. Panacek describes five categories of validation for survey instruments: 1. Face validity (does the survey make sense); 2. Content validity (expert review and revision of the survey); 3. Criterion validity (how does survey compare to established standards in the field); 4. Predictive validity (does the survey

address outcomes of interest); and, 5. Construct validity (does the survey measure the variables of interest).[83] These validation concerns have been specifically addressed in the study design. Face and content validity were addressed by piloting the survey among EM residency faculty at three institutions as described below. Criterion validity is difficult to establish for this survey, because no previous work addresses the same question. There are other survey instruments in specialties such as pulmonary and critical care that serve as a guide, but are not entirely replicated by the survey in this study.

Because the sub-specialty of palliative emergency care is in its infancy, no validated survey instruments exist to evaluate the topics covered by the proposed study. Therefore, it was important to develop a valid survey instrument to address the goals and objectives of the study. The questions were developed using frameworks of competencies that are already published in the peer-reviewed literature and that are in use in programs such as EPEC®-EM. Predictive and construct validity standards were addressed by establishing *Four Domains* of interest, described below, to meet the study objectives.

3.9 Pilot Testing

A limitation of survey research design is that the survey questions might be asked in a way that impact respondent choice of answers. Questions that are leading can introduce bias. In an attempt to reduce the possibility of this bias and to establish face and content validity, the survey was piloted among EM faculty. In June 2012, a paper copy of the survey was sent to 10 EM residency faculty members who are familiar with the Model of

the Clinical Practice of EM and who are actively engaged in curriculum development and resident education. None of the faculty who participated in the pilot survey were study subjects or EM residency leaders but were core faculty in EM residencies.

The pilot study faculty respondents were from 3 geographically distinct Level 1 trauma centers with EM residency programs (Northeastern US, Midwest, Mountain West). Eight of the ten faculty completed the survey. The two faculty who did not participate cited time constraint as a barrier to completion of the survey. The mean time to complete the survey was 15.25 minutes (range 7 to 30 minutes). Four respondents preferred electronic survey only, 2 preferred hard copy only, and 2 suggested both formats. General comments from the respondents suggested that the questions were understandable and met the stated goals of the study.

Based on general and content validity feedback from pilot testing minor revisions were made to the survey instrument in content, layout, and length. Specifically, the piloting experience suggested that faculty did not have a strong preference for electronic versus paper administration of the survey. The pilot responses also confirmed the importance of placing the two overarching objective questions (i.e. importance of HPM training and HPM teaching in EM residency) at the beginning of the survey.

3.10 Survey Administration

3.10.1 Web-based distribution

A web-based survey (Appendix 2) was initially attempted because it is the frequently used survey method for the CORD group that includes PDs, APDs, and aPDs. Web-based surveys have multiple advantages to traditional paper surveys. In addition to convenience, potentially lower costs, and ease of follow-up, there is some evidence that web-based surveys decrease non-response and errors in data processing and coding tend to be less likely.[84-86] Disadvantages include lack of interviewer involvement so unclear questions cannot be clarified.[87] Additionally, among the CORD group (which includes the study population of interest), there is the potential for non-response due to survey fatigue from the frequent surveys distributed on the list-serve.

The web-based survey instrument used commercially-available software for survey distribution and management.(CVENT, Inc., McLean VA).[88] This software is designed to deliver robust surveys to target audiences. It allows the researcher to generate survey questions, select from a variety of templates, and to determine any logic for questions (e.g. if "yes" to question 1, then advance to question 2, if "no" advance to question 3). For this study, emails of the potential study participants were uploaded into a secure database on the CVENT site and a survey link was emailed from CVENT to participants. The email provided a URL web-link and introductory paragraph about the study.

An automated reminder was sent to non-responders at two and four week intervals. Responses were assigned a random ID by CVENT, so the identities of individual respondents were not available to members of the study team. Non-responders were identified by the survey software and remained anonymous. The survey settings on the CVENT site were set for anonymous so that individually identifiable information was not available. Preliminary data reports were available from CVENT in real-time using a password-protected login.

3.10.2 Mail distribution

After approximately 7 weeks, 80 web-based responses had been received, a response rate of approximately 20 percent. A mailed survey (Appendix 1) was then distributed to the study population. The mailed survey consisted of a copy of the survey that was the same as the web-based instrument. Mailed surveys were sent to programs using previously obtained addresses. A minimum of three copies of the survey was sent to each program to account for a PD, APD, and aPD. Additional copies of the survey were sent to programs that had additional APDs or aPDs. A single postage-paid return envelope was included in the mailing so that program coordinator could return completed surveys. A paid research assistant at LVHN collected these returned surveys, coded them in a blinded manner and entered the data into a database.

For the mailed survey, the program coordinators, who provide high-level administrative support to residency programs, were provided with a $25 U.S. gift card as compensation

for the time required to distribute surveys to the PDs, APDs, and aPDs. In an introductory letter (Appendix 3) to the program coordinators, the study was described and coordinators were told they could keep the gift card whether or not their faculty completed the survey. All coordinators were permitted to keep the gift card in an attempt to minimize the possibility of survey response being skewed by receipt of the gift card. These gift cards did not represent an incentive per se because they were not provided to study subjects but to program coordinators who then distributed paper copies of the survey to subjects. The gift cards were provided to program coordinators to reimburse them for their time in distributing and returning the mailed copy of the survey.

A minimum of three surveys were mailed to each program, except in instances that programs were known to have more than three residency education leaders (i.e. the program was known to have a PD, and multiple APDs/aPDs). Programs were assigned a unique identification number and letter that was not linked to the program name or individual respondents. For example, the study ID, "1A" would represent the PD at program 1, and the study ID, "1B" would represent the APD at program 1. When completed copies of the mailed survey were received back to LVHN, a paid research assistant entered the data into the CVENT survey form and the entries were spot-checked for accuracy of data entry. At two and four week intervals following the initial mailing, a paid research assistant called residency program offices and asked program coordinators to confirm receipt of surveys and to request completion of the survey by the appropriate residency faculty.

3.10.3 Meeting distribution

Near the conclusion of the mailed survey collection, a final attempt was made to specifically encourage participation among osteopathic (DO) program faculty to participate in the survey. During the meeting of the American College of Osteopathic Emergency Physicians (ACOEP), a staff member from LVHN, who was unaffiliated with the study, placed the surveys in the back of the meeting room and asked PDs, APDs, aPDs, to voluntarily complete the survey and place the completed, anonymous survey in an envelope also in the back of the meeting room. This final method of distribution was used because, in general, osteopathic EM programs are in smaller, community hospitals without university affiliations, making it more difficult to contact the staff and faculty in these programs. The completed surveys (n=6) were then entered into the database by the paid research staff in the same manner as the mailed survey. Due to the small number of responses from the meeting distribution, these six surveys were included with the mailed surveys for analysis.

3.11 Mix-Mode Methodology

The use of both web-based and paper surveys defines one type of mixed-mode survey research methodology. This method has been well described and discussed in the literature. The response rates for a web-based and mail mixed-mode approach have been found to be equivalent to mail-only surveys.[89] Other authors have suggested that using web- and paper-based surveys in a mixed-mode approach yields improved response

rates.[90] The quality of data returned in these two types of survey modes have not been shown to be significantly different.[91]

3.12 Duration of Study

The study began in late February 2013 with an initial email to the study population. Subsequent emails were sent at approximately 2 and 4 weeks after the initial survey. Due to marginal survey response during this initial web-based survey, the study protocol was modified to be a mailed survey with a $25 gift card to the program coordinator. In mid-July 2013 this paper copy of the survey was mailed to all residency programs as previously described. The paper survey was identical in content and format to the initial web-based survey. Over the course of approximately the next 10 weeks, surveys were received back from programs. Finally, the mailed copies of the survey were also distributed among DO PDs, APDs, aPDs at the ACOEP meeting in early October 2013. In mid-October 2013, after these multiple attempts to maximize participation in the survey, data collection ended.

IV DATA ANALYSIS

Chapter Summary Statement

This chapter describes the approach to analysis of the data collected in the survey.

4.1 Data Management

Web-based survey data were temporarily stored on the CVENT database and then exported from the CVENT database into Microsoft Excel (Microsoft, Corporation, Seattle, WA) and subsequently reviewed and coded in preparation for analysis. Completed paper surveys were received back in a self-addressed stamped envelope provided to the program coordinator. A paid research assistant entered the data from these paper surveys into a separate, duplicate version of the online survey for ease of data management. Each mailed survey was given a numbered study code, and in cases where multiple surveys were received back from a single institution, surveys were given an additional letter identification (e.g. 1A, 1B, etc…) to discern between PDs, APDs, and aPDs. The completed meeting surveys were entered in the same way as the mailed surveys. Because of the small number of responses for the in-person surveys (n=6) and the simultaneous distribution of the mailed and in-person surveys, results from those two modes were combined for analysis. Surveys noted as "already completed" were excluded from the data set.

Answers to survey responses were checked for consistency and coded for analysis. In order to better capture the regional geographic distribution of EM residency programs,

states were coded into the following regions using U.S. Census definitions: Northeast, Mid-Atlantic, East North-central, West North-central, South Atlantic, East South Central, West South Central, Mountain, and Pacific.(Appendix 4) The following questions and associated variable collected in the survey were excluded from final analysis due to poor response rate that prevented any meaningful analysis:

- Are any faculty (including yourself) in you residency program trained or board-certified in HPM?
- How many EM faculty have formal HPM training?
- How many core faculty serve your residency?
- Do you use all or parts of the EPEC-EM® curriculum in your residency program?
- Have you attended the EPEC-EM® training program?

4.2 Qualitative Responses

Because the survey contained open-ended questions, as well as the opportunity for comments on closed-ended questions, qualitative data were collected from the survey. The survey was not intended to be qualitative. However, providing respondents with the chance to further elaborate on answers or to comment on items not queried in the survey was included to collect as much useful information as possible from respondents. These qualitative responses can provide insights into other areas or depth of focus that were not addressed in the survey.

Qualitative comments were reviewed and classified into the *Four Domains*. Individual comments were paraphrased into general thematic comments with notation made for

those themes with multiple comments. These qualitative comments are summarized in the results section below and presented fully in Appendix 12.

4.3 Descriptive analysis

The study was designed to ensure respondent anonymity and therefore does not allow for comparisons between responders and non-responders. The anonymous methodology used in this study minimizes the potential for social desirability bias. Sampling error, which is the variability among statistics from different samples, and can be problematic in survey research, is not a concern in this study because the entire population of interest is included in the study sample.

Even without maintaining the anonymity of individual study subjects, demographic data about non-responders would have been difficult to obtain. For example, there is no reliable way to obtain the number of years that a PD has been in their position or to determine if faculty members at a non-responder's institution are trained in HPM. Ideally, the non-responders and responders can be compared in survey data to identify any meaningful differences to eliminate any effect of non-response bias on the study results. However, the mixed-mode design provides the opportunity to compare respondents who completed the survey early and in the web-based format compared to those who answered later and on paper (either through the mailed or at the ACOEP meeting).

Several variables were excluded from the final data analysis due to a lack of observations

(defined as <70% of total observations complete for the variable). During the analysis process, it was decided that the lack of response limited any meaningful conclusions that could be made from responses to those questions. Several of these variables are still presented in the demographic tables to help to describe the population of respondents, albeit in a limited manner.

As previously described, the selection of variables for inclusion in the survey and analysis was focused on the limited, existing literature about HPM education in EM residency training. The outcome variables of interest to the study goals and objectives are whether respondents believe that HPM competency training is important in EM residency training and whether respondents currently teach HPM in their residency programs. The answers to these questions are fundamentally important because if education leaders in EM do not consider this training to be an essential part of EM residency training, then there is unlikely to be any revisions or modifications to current residency curriculums to include these competencies. Further, the specific aims of the study, particularly best practices, challenges, and opportunities could not be adequately addressed if the fundamental question of importance is answered largely in the negative. Finally, the policy and practical implications of a largely negative response to the importance of HPM training in EM would be that residency programs would not prioritize the training and would be unlikely to dedicate curriculum time or other resources to such training.

Individual respondents were considered the sampling frame of choice. Comparisons were made with regard to education leadership position (e.g. PD, assistant PD), residency program characteristics (e.g. HPM elective available for residents), and institution characteristics (e.g. availability of HPM Consult in ED). The scores from respondents' answers to the survey questions that were asked in Likert format were averaged to produce a mean score. Continuous data are presented as a range and standard deviation unless otherwise noted.

Inferential statistical analysis included chi-square (χ^2) tests, t-tests, and Fisher's exact test, Pearson Correlation, and ANOVA. The following analyses were applied to the multiple types of data collected in the survey: correlation (continuous vs. continuous variables); t-tests (binary vs. continuous variables); ANOVA (categorical vs. continuous variables); χ^2 and Fisher's tests (categorical vs. categorical variables).

Chi-square tests for three or more groups are adequate when the outcome is categorical.[92] If the outcome is numerical, analysis of variance (ANOVA) is used to analyze the differences between group means of three or more groups. With the use multiple two-sample t-tests, there is an increased chance of type I error (i.e. incorrectly rejecting the null hypothesis, H_o). ANOVA is best used to compare means of three or more variables for statistical significance, because it discerns if differences exist among the means of the group and protects against the possibility of repeatedly having a type I error, or what Dawson and Trapp call "error inflation."[92] Equality of variances were

determined and then pooled (equal variances) or Satterthwaite (unequal variances) probabilities were reported.

Following bivariate analysis, a multivariate regression model was run with those variables that had a sufficient number (>70%) of observations and were shown to be statistically significant at $p<0.05$ from the inferential analysis. Regression analysis was approached based on the results of these analyses. Variables that have been shown in the literature to influence palliative medicine training or those variables shown to be significant in the bivariate analyses were included in the regression model. Linear and logistic regression analysis was performed depending on the independent variables on the two outcomes of interest (i.e. "HPM importance" and "HPM teaching") as described above. $P<0.05$ was considered statistically significant. Statistical analyses were performed using SAS software (SAS Institute, Inc, Cary, NC).

4.4 Comparisons by title within and between institutions

The primary sampling unit for this study is the individual subject (i.e. PD, APD, aPD). These individual subjects are assumed to represent independent observations. It is possible that random effects could influence these observations, and these effects need to be considered when making any statistical inferences regarding the survey data and the interpretation of those data. For example, a PD, an APD, and an aPD in the same

residency could give responses that are similar to each other and different than the responses given by the subjects at another institution.

Individuals in the same cluster (e.g. hospital) might be similar in terms of measurements of interest, thus minimizing individual subject independence, a concept known as intra-class correlation. Intra-class correlation generally increases standard errors of the estimates, and stratification is a method for decreasing standard errors. In the initial study design, the plan was to achieve this goal by comparing PDs, APDs, and aPDs in individual institutions to each other as well as to respondents with the same titles in other institutions. For example, do PDs, APDs, and aPDs at "Institution A" have similar attitudes about HPM importance in EM Training and do they have similar opinions in the *Four Domains* when compared to PDs, APDs, aPDs at "Institution B"? An alternative strategy would be to cluster individual respondents into their program/institution. For example, the education leaders at a single institution would submit individual responses, but the responses would be clustered as a single response from that specific institution. This clustering strategy has the potential for underestimating individual responses, but could provide important information about the institutional factors.

McNemar and paired t-tests were used to analyze those respondents who had returned paper surveys and were from the same institution(s) using the coding schema described in the methods. Web-based surveys had no study codes assigned and therefore could not be used in this analysis. This analysis was intended to determine if there were any

similarities or differences between respondents from the same institutions. Due to the limitations of the study design, the sample size was too small to reach any conclusions on this question using these analyses.

V RESULTS

Chapter Summary Statement

This chapter summarizes the study results.

5.1 Demographic Variables

Variables in the survey were based on the HPM competencies for EM physicians that have been previously published (Figure 1).[23] These variables were further organized into the conceptual framework of *Four Domains* presented in Figure 2. Demographic variables for individual subjects as well as their residency programs and institutions were included to determine if any of these variables had an impact on the outcomes of interest.

Summary demographic data are presented in Appendix 5. Of the 402 individuals identified as PDs, APDs, or aPDs, 201 returned completed surveys. Two additional surveys, one completed by a resident and one by a program coordinator, were excluded from the analysis. Among the 201 surveys, 80 were completed online, 115 were completed via direct mail, and 6 were completed in-person. Almost half of the programs that responded were MD (46.3 percent) and almost 15 percent were DO (there were 34 percent missing observations for this variable).

Among the 201 respondents, 101 (50.2%) were PDs, 57 (28.4%) were APDs, and 43 (21.4%) were aPDs. On average, PDs had been in that position for an average of 7.04 years (SD 6.89), APDs an average of 4.67 years (SD 3.92), and aPDs 3.07 years (SD

2.34). There were no statistically significant differences in the distribution of basic demographic characteristics between PDs, APDs, and aPDs. However, there were differences in bivariate and regression analyses that distinguished aPDs from PDs and APDs. These differences are described below.

Forty-two of the fifty states and the District of Columbia have at least one emergency medicine residency program. Michigan (N=26), New York (N=23), Pennsylvania (N=18), California (N=15), Ohio (N=13), and Texas (N=11) have the largest number of EM residency programs, and the programs in these six states represent more than half of all EM training programs in the U.S. The following eight states do not have EM residencies: Vermont, Idaho, North Dakota, South Dakota, Wyoming, Montana, Alaska, and Hawaii. Responses were received from EM education leaders in at least 29 different states, with 66 individual responses from the six states with the largest number of EM residencies. An additional 64 responses were missing for this variable. Therefore, 48 percent (66/137) of the responses with state identification were from Michigan, New York, Pennsylvania, California, Ohio, and Texas, consistent with the overall distribution of EM programs in these states.

Two-thirds (133/201) of respondents reported having access to hospice and palliative medicine consultants. Respondents in the East North Central, Mid-Atlantic, and South Atlantic regions reported having an institution-sponsored HPM fellowship in their institution more often than respondents in other regions ($p<0.02$; missing n=68).

5.2 Comparisons of paper and web-based responses

Of the 201 surveys, 80 (40%) were completed using the web-based survey and 121 (60%) were completed on paper. Summary characteristics of the respondents between these two modes of distribution are presented in Appendix 6. There were not significant differences noted between the web-based and paper respondents with regard to demographic characteristics or with their responses to the questions in the *Four Domains*. The paper compared to web-based surveys can serve as a proxy comparison between late (i.e. paper) and early (i.e. web-based) respondents since there was a short lag period between the distribution of these two modes.

5.3 Responses to *Four Domains*

Descriptive analyses for the *Four Domains* were performed. The Likert scores were assigned means and standard deviations to describe the variation in responses. Means were used because the responses for most questions were well distributed. Appendices 7 through 10 summarize the means and standard deviations for all responses in the *Four Domains*.

In the *Domain* of "Importance of HPM Competency Senior Resident" (i.e. how important are individual competencies for senior EM residents), difficult communication/breaking bad news/death disclosure (i.e. crucial conversations) (mean 4.88, SD 0.40), management of pain (mean 4.77, SD 0.53), and management of the imminently dying (mean 4.74, SD

0.53) were the three variables with the highest mean scores. Respondents identified Crucial Conversations (mean 4.28, SD 0.66), Management of pain (mean 4.17, SD 0.72), and Management of the imminently dying (mean 3.91, SD 0.88) as the three skills in which their residents are most proficient. Bedside teaching (mean 4.53, SD), mentoring from HPM faculty (mean 4.11, SD 0.97), and case-based simulation were identified by respondents as the three most effective educational training methods for delivering HPM teaching to EM residents. Lack of HPM experience or expertise among faculty (mean 3.57, SD 1.21), lack of faculty interest in HPM (mean 3.42, SD 1.20), lack of resident interest in HPM (mean 3.04, SD 1.20) had the highest mean scores among the variables.

As shown in Appendix 11, there were large differences in mean Likert scores for the Importance of HPM Competency Senior Resident and the Senior Resident Skill Level *Domains* for the following six variables: withdrawal of non-beneficial interventions, management of imminently dying, HPM referrals, ethical/legal issues, spiritual/cultural issues, management of dying child showed. The respondents' ratings of the importance of these specific competencies compared to their judgment of their residents' skills in these competencies suggest discrepancies in actual skills relative to the competency.

Qualitative comments are summarized in Appendix 12. Several themes appeared to be common in these comments. In the "Barriers" *Domain*, respondents noted time in the curriculum (n=6 comments), a lack of HPM consultation availability in "off hours" (n=8), and a lack of faculty interest and training (n=3) as reasons that it is difficult to

integrate HPM competencies into EM training. In the "Educational Methods" *Domain*, six respondents noted that HPM competency training does not need to be a separate curriculum component in residency training because it is part of the daily clinical practice of EM. Additionally, six respondents expressed the need for more formal HPM education for EM residents and suggested HPM toolkits, lectures, and a structured elective experience as methods to achieve this training. In the "Competency Importance" *Domain*, respondents expressed that HPM competencies should be part of core EM residency education requirements (n=2), because the aging population will require HPM services (n=2), and these competencies are best taught by EM faculty (n=1).

5.4 Bivariate analysis, HPM Importance (Appendix 13)

Bivariate analyses were performed for the two outcome variables: "Importance of HPM Training in EM" and "Currently Teach HPM in your Residency." For the "HPM Importance" outcome, difference of means (t-test) were performed with the following variables: Gender; Institution sponsored HPM program; HPM Consult Available in ED; HPM Rotation Available for EM Residents; Title in Program. The following were found to have significant association with HPM Importance: "HPM Consult Available in ED" ("Yes" mean score, 7.20, 95% CI 6.87,7.54 vs. "No" mean score, 6.54, 95% CI 6.10, 6.99); "HPM Rotation Available for EM Residents" ("Yes" mean score, 7.29, 95% CI 6.97, 7.61 vs. "No" mean score, 6.60, 95% CI 6.14,7.05), and "Assistant PD" ("Yes" mean score, 7.6, 95% CI 7.06, mean score, 8.24 vs. "No" 6.78, 95% CI 6.47, 7.07).

Analysis with Pearson correlation coefficient showed associations between several independent variables and the outcome of "HPM Importance" (Appendix 15). Respondents who thought HPM competency training was more important found the "Barriers" *Domain* to be less important (PCC -0.1416, $p<0.05$), and specifically the "Lack of faculty interest in HPM" (-0.1936, $p<0.006$) and "Lack of resident interest in HPM" (-0.2054, $p<0.0036$) as less important.

Further, higher mean scores on HPM Importance had positive associations with the following independent variables: "Senior Competency Importance" (mean score for *Domain*), "Crucial Conversations" (0.2261, $p<0.0014$); "Senior Competency Importance – Management of Pain" (0.2414, $p<0.0006$); "Senior Resident Skill – Management of imminently dying" (0.3397, $p<0.001$); "Effectiveness of bedside teaching" (0.3159, $p<0.0001$); "Effectiveness of mentoring from HPM faculty" (0.3677, $p<0.0001$); "Effectiveness of case-based simulation" (0.1781, $p<0.0114$).

Using the ANOVA procedure (Appendix 16), there was a statistical difference in association between programs that were ACGME accredited and those that were dual AOA/ACGME accredited with regard to the outcome variable of "Importance of HPM teaching" (difference in means 1.7814, 95% CI 0.1272, 3.455). However, there were a small number ($n<10$) of dual programs, limiting the interpretation of this relationship. There were no statistical differences found in association for the other variables included in the ANOVA model: Number of Residents in Program; Type of Hospital; and, Hospital Geography.

5.5 Regression, HPM Importance (Appendix 17)

Several variables described in the bivariate analysis had a large number of missing observations and therefore were not included in the regression model. The linear regression model included the following variables: male gender; aPD; Familiar with EPEC-EM; and, the mean score for the *Domain* "Barriers to HPM education." Male gender was not statistically significant in the regression model. For aPDs, there was a 0.7739 (SE 0.3253, $p<0.018$) unit change in "HPM Importance." Compared to those who are "not Familiar with EPEC-EM," those respondents who are "Familiar with EPEC-EM" had higher mean scores of "HPM Importance" by 0.9520 units (SE 0.3191, $p<0.0032$). There was a trend toward statistical significance with the mean score for the "Barriers" *Domain* (-0.3209, SE 0.1672, $p<0.0565$).

5.6 Bivariate Analysis, HPM Taught in EM Program (Appendix 14)

Bivariate and regression analyses were also performed for the outcome variable of "Do you currently teach HPM competencies in your EM program?" Bivariate analysis (χ^2) showed the following variables to be associated with teaching HPM in an EM residency program: "Familiar with EPEC-EM" (59.3% teach vs. 40.7% do not teach, $p<0.015$); "HPM Consult Available in ED" (59.5% vs. 40.5%, $p<0.0001$); and, "HPM Rotation Available for EM Residents" (59.3% vs. 40.7%, $p<0.0001$).

A statistically significant difference in mean score was found for the "Senior Competency" *Domain* between those respondents who teach HPM in their programs and those who do not (mean score, teach 4.53, 95% CI 4.46,4.60 vs. mean score do not teach 4.36, 95% CI 4.26,4.46). Within the "Senior Competency" *Domain*, the variable "Management of the Imminently Dying" was also statistically significant (mean score, teach 4.82, 95% CI 4.73,4.90 vs. mean score, do not teach 4.62, 95% CI 4.46,4.79). For the mean score in the *Domain* "Senior Resident Skill," there was statistically significant difference between those respondents who teach HPM and those who do not (mean score, teach 3.97, 95% CI 3.88, 4.06 vs. mean score, do not teach 3.67, 95% CI 3.57, 3.78). The importance of three specific "Senior Resident Skills" were significantly different between the two groups: "Management of Imminently Dying" (mean score, teach 4.83, 95% CI 4.74, 4.91 vs. mean score, do not teach 4.61, 95% CI 4.47, 4.75); "Crucial Conversations" (mean score, teach 4.37, 95%CI 4.26, 4.49 vs. mean score, do not teach 4.15, 95% CI 3.99, 4.32); and, "Management of Pain" (mean score, teach 4.28, 95% CI 4.14, 4.41 vs. mean score, do not teach 4.02, 95% CI 3.87, 4.18).

In the "Barriers" *Domain*, there was a significant difference in the overall mean score of the *Domain* between those who teach and those who do not teach HPM competencies in their programs. (mean score, teach 2.71, 95% CI 2.55, 2.86 vs. mean score, do not teach 3.06, 95% CI 2.90, 3.22). In this *Domain*, "Lack of HPM Experience/Expertise Among Faculty" (mean score, teach 3.29, 95% CI 3.06, 3.52 vs. mean score, do not teach 3.97,

95% CI 3.75, 4.20), and "Lack of Faculty Interest in HPM" (mean score, teach 3.27, 95% CI 3.04, 3.50 vs. mean score, do not teach 3.67, 95% CI 3.44, 3.90) were significant.

In the *Domain* of "Effectiveness of Educational Methods," a single variable "Mentoring from HPM Faculty" showed a statistically significant difference between respondents who teach HPM and those who do not teach HPM (mean score, teach 4.23, 95% CI 4.06, 4.40 vs. mean score, do not teach 3.92, 95% CI 3.69, 4.16).

5.7 Regression, HPM Taught in EM Program (Appendix 18)

Following bivariate analysis, the following variables were analyzed in a multivariate logistic regression model: "male"; "Familiar with EPEC-EM"; "HPM Consult Available in the ED"; "HPM Rotation Available for EM Residents"; and, "Barriers to HPM Education" (*Domain* mean score). There was strong association between the variable "HPM Consult Available in ED" and "Teach HPM in EM residency." (mean score, 3.082, 95% CI 1.519, 6.250). A moderate association was found between "HPM Rotation Available for EM Residents" and the teaching of HPM (2.069, 95% CI 1.089, 3.970).

VI DISCUSSION

Chapter Summary Statement

This chapter discusses the implications of the study results on the current state and future direction(s) of HPM competency education in EM residency training.

6.1 Study results in context

Emergency physicians need the skills and competencies necessary for the delivery of quality palliative and hospice care to ED patients. This training is best addressed during residency when physicians build the knowledge and skills that are the foundation for life-long professional development and clinical practice. The results of this study provide the first comprehensive review of the current state of HPM competency training and teaching in emergency medicine residencies.

Generalizability is a fundamental concern in survey research. The survey's response rate and the wide representation of programs by size, location, and hospital type among other demographic variables, make the results generalizable to EM education leaders. The characteristics of respondents and their programs suggest that the survey had responses that are representative of EM residency programs. Response bias can impact generalizability if responders and non-responders are different in ways that impact their answers with regard to the outcomes of interest. Although there is the possibility that non-responders are different in some characteristics compared to responders, this

difference cannot be ascertained in the current study due to design constraints implemented to ensure anonymity of respondents. Comparisons between early (i.e. web-based) and late (i.e. paper-based) respondents do not suggest marked differences between the groups and might serve as an approximation of responders compared to non-responders.

There was variability in the Likert responses among specific variables in the *Four Domains* suggesting that EM education leaders potentially prioritize items within these *Domains*. Certain competencies, resident skill levels, barriers, and educational methods trend toward the "more" or "less" directions on the Likert scales. This general finding is arguably the most substantial of the research presented in this report because these items can be prioritized and targeted for focused interventions and resource-dedication. It is especially noteworthy that there were discrepancies between the perceived importance of certain competencies and the reported resident skill levels in these competencies. For example, crucial conversations, management of pain, and management of the imminently dying emerged as the three most important competencies for the senior EM resident to have, and these were the same competencies that senior residents were perceived to have the best skills. Therefore, these areas might require minimal time or resource dedication in the EM residency curriculum. Conversely, the management of the dying child was considered very important as a competency but emerged last as a perceived skill among senior residents. These results could form the basis of targeted educational resources and innovative curriculum designs aimed at reducing the discrepancies between important

competencies and resident skills in those areas. As shown in Appendix 10, there is a difference in mean Likert scores for the perceived importance of HPM competencies and the reported skills of senior EM residents in these same competencies. This is a key finding because it identifies competencies that respondents thought were important but that residents were not necessarily highly skilled in performing. These discrepancies are a potential area for targeted educational interventions in EM residency curricula.

In personal conversations with CORD leadership and program leaders from around the county, the anecdotal consensus is that the average tenure in the position of PD/APD/aPD in EM is between 5 and 7 years. The demographic data collected in this survey reflect that anecdotal experience. Further, ACEP estimates that approximately 70 percent of emergency physicians are males.[93] Gender distributions in the survey responses reflect the distribution of EM education leaders and EM physicians in general, although in the last decade, there are growing numbers of female emergency physicians, reflecting overall trends in physician gender. These examples of demographic factors suggest that the sample of respondents is representative of EM educational leaders in general.

The qualitative responses summarized in the results section are too few in number to draw definitive conclusions based upon them. Additionally, no demographic or other descriptive analysis was performed on these responses. However, these responses do provide some insights into general questions and concerns that were not addressed specifically in the survey, and potentially pose questions for further areas of investigation

on HPM education in EM residencies. For example, there were multiple responses expressing the challenge of delivering HPM competency training within the already considerable time constraints of residency education. Multiple respondents identified time as a barrier. The closely related mention of "other priorities" by several respondents suggests that the current breadth and depth of EM training might be a barrier that was not evaluated in this study. These are barriers that could be further investigated in future research and potentially have important implications for the design and implementation of educational policies and interventions.

The results of this study also identify several individual and institutional characteristics that might impact the perceived importance and/or teaching of HPM competencies in EM. Specifically, familiarity with EPEC®-EM, the availability of HPM consultation service in the ED, and the availability of rotations in HPM for EM residents impact the outcomes of interest. Whether these relationships are directly causal (e.g. the presence of HPM in an institution makes it easier to overcome faculty barriers to teaching HPM) or associative (e.g. respondents who practice and teach in institutions with HPM services are more likely to have HPM rotations available for residents) is not addressed in this study.

Lastly, aPDs were more likely to respond that teaching HPM was important compared to APDs and PDs. This finding is important because it could signal future directions in HPM education in EM, since many aPDs ultimately become APDs and then PDs. If aPDs view HPM training as important, there might be a movement toward increasing HPM

training in EM residencies in the future. Conversely, the differences between aPDs and PDs/APDs could reflect the unique perspectives of each of these positions on residency curriculum development and delivery. PDs have unique pressures of program leadership and management that might fundamentally impact their responses compared to aPDs. If the latter is the case, it is possible that the responses of aPDs would change when they become APDs and PDs. One future research question to better address this specific difference would be to longitudinally follow aPDs to monitor their responses to the same survey questions as their positions change.

6.2 Limitations

Survey research has inherent limitations that have been described extensively in the literature. A common element of survey research is that the collected data are generally subjective, even if quantitative data are gathered. There are several limitations to this study and its results. First, there is the possibility that EM programs had changes in PD, APD, or aPD leadership during the period of data collection. Throughout the course of an academic year and during the summer months, there are changes to academic appointments in an EM program. These changes were not reflected in real-time as the study progressed. The initial database of study subjects was obtained at the outset of the study and was not subsequently updated. Therefore, it is possible that some educational leaders in EM were unintentionally excluded from analysis because they did not receive

the survey. Conversely, it is possible that some individuals received the survey who were not in the position of PD, APD, or aPD at the time that they received the survey.

Response bias is a concern in survey research. Specifically, response bias might have resulted in overrepresentation of those education leaders with a greater interest in HPM competency education, compared to those with less interest. The response rates in the *Four Domains* were robust, yet for some specific competencies and topics within the individual *Domains*, there were fewer responses. There is no clear explanation for this phenomenon. One potential explanation for non-response in this study is that subjects wanted to further protect their identity and therefore did not answer demographic questions or those questions that were perceived as more sensitive in nature.

Additionally, it is possible that non-response for demographic questions was due in part to the intentional placement of these questions at the end of the survey, presumably when respondents are most fatigued. As with more sensitive questions, it is also possible that respondents chose not to answer demographic questions in order to protect their identities. The response rates to the *Four Domains* were very robust, and therefore the objectives of the study can be realized even without complete demographic responses.

The response rate of 50 percent and the response from nearly 50 percent of all residency programs presumably makes the respondents representative of the actual population of program leaders and programs in general. The response rate of fifty percent (50%) in this study is acceptable in comparison to response rates in other published surveys. According

to Rea and Parker, "A response rate of 50 percent can be considered satisfactory for purposes of analysis and reporting of findings as long as the research is satisfied in the representativeness of the response."[87]

The first question in the survey used a 10-point Likert scale and asked, "How important is it to include hospice and palliative medicine competencies in EM residency training curricula?" The second question used a yes/no format and asked, "Do you currently teach HPM competencies in your residency?" These initial two questions represent the main outcomes at stake in this study and required the most complete number of observations to meet the study's goals and objectives. The specific ordering of questions could have potentially influenced responses to questions in the *Four Domains*. As previously discussed, the placement of demographic questions near the end of the survey possibly resulted in less complete data for these variables.

The missing data make it more difficult to draw associations or causal relationships between these demographic characteristics and the responses in the *Four Domains*. However, some general statements and trends can still be derived from the data collected in this survey. These data provide a foundation, not a definitive conclusion, to the themes and objectives proposed in the introduction of this report. As an initial attempt at characterizing the state of HPM competency in EM training, the results of this study are a basis for additional research on the topic.

It is difficult to ascertain if selection bias had any impact on the results of the study. Including the entire known population of EM education leaders should have minimized the possibility for selection bias. This population, however, is particularly susceptible to survey fatigue because of frequent informal surveys that are distributed on the CORD list-serve. Approximately once each week a member of the CORD list-serve distributes short, informal surveys to members. These surveys are usually intended to garner feedback about best practices about a particular subject. For example, a recent survey asked CORD members to respond to the responsibilities they assign to residents with regard to communication with pre-hospital and EMS providers. The frequency of these surveys raises the possibility that individuals would not be captive to an online survey, and could explain the better response rate to the paper survey.

There is the possibility that subjects could have completed the survey more than once because of the online and then mailed versions of the survey being distributed to the same group of study subjects. In an attempt to minimize this possibility, a check box was included with the mailed survey requesting that respondents check the box if the survey was completed online. Those surveys that were returned with this box checked were excluded from analysis. Due to the anonymous collection of responses it is not possible to determine duplicate responses.

There is the limitation that non-responders could not be compared to responders due to the anonymity of the survey. Beyond the anonymous design of the survey, it was not

feasible administratively to obtain data for all programs to make comparisons between responders and non-responders. It is also possible that respondents differ from non-respondents in that respondents are those EM residency faculty who have more interest in palliative medicine concepts compared to non-responders. With a response rate of nearly 50 percent, from individual faculty and in number of residency programs, the responses are a representative sample of all EM residency programs. Further, the distribution of responses by individual state and regional geographic area strengthen the argument that the respondent sample is representative of EM residency program leaders.

VII FUTURE DIRECTIONS

Chapter Summary Statement

This chapter offers potential areas for future research and investigation based on the findings of this study.

7.1. Contextual Contributions of Current Research

The results of this survey have important educational implications for both emergency medicine and hospice and palliative medicine training. This research focuses on EM training and how to effectively and efficiently provide EM trainees with the necessary competencies to provide care to patients and families with hospice and palliative care needs. It has been suggested that educational interventions can improve EM residents' mastery of HPM competencies.[94]

The results of this study can inform residency program directors and other EM educators about how to more actively integrate HPM competencies into EM residency training curriculums. Adequate HPM training and application in the ED can lead to higher quality patient care, improved patient and family satisfaction, improved ED throughput, and appropriate use of finite critical care resources.[16,20-23] There is a need to identify opportunities for improved HPM competency instruction in EM residency training programs to close gaps in HPM knowledge and skills among emergency physicians. As evidenced by the variability in mean scores in the *Four Domains*, there are discrepancies

between the perceived importance of certain HPM competencies and resident skill level in those competencies. These discrepancies offer an opportunity for actionable curriculum modification and development. A reasonable next step for investigation would be to develop and implement educational innovations that are directed at improving resident skills in these specific competencies.

The implementation of change is difficult in medical education, especially because of multiple competing priorities and finite time to deliver complex residency curriculum. Program directors and other educational leaders in EM residency programs are central stakeholders and provide significant institutional and specialty-specific influence in the education of residents. If these leaders can be mobilized to adopt a "best practices" approach to HPM competency education, specialty and institutional leaders are more likely to provide the necessary resources to foster and sustain palliative medicine competency education in emergency medicine residency programs. Residency training has lasting impacts on how physicians practice throughout their careers, making residency an especially critical time in the journey of professional development for physicians.[95] When emergency physicians are well trained to provide palliative care during residency, it is more likely that they will employ HPM principles in their post-residency practice.

This research also has the potential to build collaborative educational and curriculum efforts between EM and palliative medicine training programs. For example, HPM

fellowship programs have expertise in delivering curriculum related to the specific competencies that are needed by emergency physicians. There are opportunities available for partnerships with activities such as journal clubs, didactic sections, and simulation cases. These resources are variable depending on institutional resources available where the EM program is located. These resources include whether an institution has an in-house HPM fellowship program or service. Additionally, there could potentially be opportunity for an EM program to have educational programming with a local HPM program or service. Educational activities and the clinical integration of HPM and ED programs and services often require a champion, who can design and implement sustainable, multi-disciplinary efforts.[48]

The Improving Palliative Care in Emergency Medicine (IPAL-EM) Board of Directors recently published a survey of its leaders suggesting that there are a variety of strategies that currently exist to integrate palliative care in the ED, including board-certified emergency clinicians in HPM.[96]

There are other models for HPM introduction into the ED. For example, the "ED-focused advanced" palliative care clinical demonstration involves an ED that is "highly engaged and may direct the integration; may have ED-palliative medicine double board-certified clinician; the ED is highly engaged; such a program can exist in the absence of a hospital palliative care service."[96] Realistically, this advanced model might only be available in select institutions with unique resources in both EM and HPM, including established

training programs. Despite this limitation, as EM physicians receive more training in HPM competencies, they can improve the overall care for patients who present to the ED and require these services.

Quill and Abernathy point out that the non-HPM specialist, such as emergency physicians, play an increasingly important, even critical, role in providing "primary palliative care" including basic management of pain and symptoms, basic management of depression and anxiety, basic discussion about prognosis, goals of care, suffering, and code status.[43] The results of this study provide additional evidence about how, even in the absence of formal fellowship training in HPM, emergency physicians can and should possess an extended repertoire of "primary palliative care" skills.

7.2 New Training, New Evaluation

Any innovations in HPM competency training in EM residencies will be subject to a new evaluation system founded on the previous ACGME Core Competencies. In July 2013, Emergency Medicine joined seven other specialties (Radiology, Internal Medicine, Neurosurgery, Orthopedic Surgery, Pediatrics, Urology) to adopt "Milestones," a cornerstone of the Next Accreditation System (NAS) that will define how the next generation of physicians is trained.[97] As a part of the NAS, EM residents are now evaluated on "Milestones." They were derived from the ACGME Core Competencies (Patient Care, Professionalism, Interpersonal and Communication Skills, Medical

Knowledge, Systems-based Practice, Practice-based Learning and Improvement) and are intended to be a set of transparent, competency-based, behaviorally observed, skills that are developed throughout residency training and into independent practice. The Milestones development was led by the Accreditation Council for Graduate Medical Education (ACGME) and the American Board of Emergency (ABEM), along with stakeholder groups within the specialty of EM.

Although EM residents would not necessarily be required to track their individual development in specific competencies of HPM, many of these competencies are captured in the Milestones. For example, Milestone 20 describes, "Professional values – Demonstrates compassion, integrity, and respect for others as well as adherence to the ethical principles relevant to the practice of medicine," with the highest level skill (Level 4) defined as "Effectively analyzes and manages ethical issues in complicated and challenging clinical situations." Milestone 22 describes, "Patient Centered Communication – Demonstrates interpersonal and communication skills that result in the effective exchange of information and collaboration with patients and their families" includes as a Level 4 "Uses flexible communication strategies and adjusts them based on the clinical situations to resolve specific ED challenges, such as drug seeking behavior, delivering bad news, unexpected outcomes, medical errors, and high risk refusal-of-care patients."[98]

7.3 Future Research

The results of the research presented in this report provide a foundation for future research in EM-HPM in both education and practice contexts, and among various groups of stakeholders. For example, one area for future research is to provide a comprehensive assessment of EM residents regarding HPM competency training during their training. The results presented in this report provide a solid foundation and many of the same questions posed to PDs, APDs, and aPDs could be asked of residents. Comparisons could then be made between EM residents' perceptions of HPM curriculum and competencies and the perceptions of PDs, APD, and aPDs. Interestingly, a recent study of internal medicine residents suggests that, "trainee self-evaluations do not predict assessments by their patients, patients' families, or their clinician-evaluators regarding the quality of end-of-life communication."[99] Lamba and colleagues surveyed a small group of residents and faculty and identified four areas requiring more training for EM physicians: management of hospice patients; withdrawal of life support; prognostication; and, pain management.[61]

Another area for further research is how to equip EM residents and emergency physicians with the competencies necessary to care for special populations with HPM needs, including pediatric patients. Chronic, complex, and terminal illnesses are common among adults. However, technologies and innovations in pediatric care have led to many children surviving with previously fatal illnesses with longer life expectancies. Children with complex medical illnesses have high rates of ED utilization, with one children's

hospital reporting that children with complex illnesses make up 20 percent of all pediatric ED visits.[100] The ED management of these children's HPM needs pose challenges unique to the pediatric population.

There also exists an opportunity for patient-centered research that arises from the results in this research. The competencies and skills identified by the residency education leaders training emergency physicians should be congruent with patient and family needs. More specifically, a question for future research is "What do patients/families with HPM needs want from the emergency physician during an ED visit?" In other words, what competencies do these patients want or need the emergency physician to have. One possible way to address this question in the future would be to hold focus groups of patients who are already linked to community-based HPM services to evaluate their experiences in the ED as it relates to their illness. A recent Australian study suggested that early admission to community-based palliative care reduces ED utilization for patients with cancer by more than 20 percent.[101] Perhaps a key competency for emergency physicians is to be able to evaluate the HPM services already available, to establish system-level "triggers" to identify patients who have HPM needs, and then to connect patients to those services.[16]

The results of this study offer a basis upon which to develop HPM curriculum for EM residents and practicing emergency physicians. How that curriculum develops remains to be seen. Educational leaders can use the information regarding gaps between

competencies and perceived skill level of residents in those competencies to develop targeted educational efforts. For example, one author recently proposed a four-part lecture series and evaluative program for introduce EM residents to HPM topics in very specific competencies such as end-of-life discussions.[102] There is also the opportunity to address these gaps with existing educational methods and instruments. Gisondi and colleagues have described the use of EPEC®-EM components for EM residents.[70] Finally, educational leaders can use the barriers identified in this study to advocate within their own institutional graduate medical education structure and through professional organizations such as CORD and ACEP to begin to address the macro-level challenges that exist in HPM education in EM residencies.

Curriculum development could be a collaborative effort between EM and HPM faculty in an institution, or could be an evolving role undertaken by physicians who have completed EM residency and HPM fellowship training. Further, HPM competencies might be integrated into and combined with existing curriculum components, such as ICU rotations. Multiple qualitative comments in this survey highlighted that, for many EM faculty, teaching HPM competencies is not considered a distinct activity from the content delivered in daily bedside clinical teaching in the ED. These respondents might be more likely and willing to adopt a curriculum that integrates HPM competencies into existing teaching and educational methods. Another option for developing HPM competencies in EM training would be the development of a standardized elective experience for EM residents that would focus on the "primary palliative care" skills described by Quill.[43]

If this type of elective were offered at several institutions around the country, it could supplement the HPM experience for visiting EM residents who do not have HPM in the hospital where they are completing their training.

As curricular innovations are introduced, their delivery methods will need to be tailored for residents. M-learning or "mobile learning" such as podcasts, etc… could serve as a platform for the delivery of standardized HPM content that could then be put into practice in a bedside clinical situation. M-learning is already being widely deployed to delivery portions of residency curriculum in other specialties.[103] In emergency medicine, there has been a rapid and diffuse proliferation of m-learning platforms, particularly podcasts, that are popular tools for EM residents to obtain clinical and other knowledge.

In the longer term, after implementation and evaluation of HPM competency training in EM residency curricula, a laudable goal would be to expand and offer similar training tailored to the practicing emergency physician. These physicians could provide feedback and needs assessments for their practice environments, a task that could conceivably be accomplished using large databases of emergency physicians maintained by professional organizations in the specialty. For example, ACEP maintains the Emergency Medicine Practice Research Network (EM-PRN), an approximately 1,200 member voluntary database intended to engage practicing "real-life" emergency physicians in important research and policy topics that impact patients in community practice.

7.4 Conclusions

As the population continues to age, and more patients present to emergency departments for acute exacerbations of advance-stage chronic illnesses and in the final stages of terminal illnesses, the ability to provide patient-centered, cost-efficient, and high quality palliative care in the emergency department is imperative. This study is novel in providing data that are a foundation for meeting that need by providing actionable priorities in the development of curriculums that train EM residents in a core set of palliative medicine competencies. The results of this study will help to inform EM education leaders, policy makers, and executive leaders about how to more actively integrate palliative medicine competencies into EM residency training curriculums. The results of this study will provide a foundation for the development and delivery of curriculum content for EM residents in palliative care.

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APPENDICES

Appendix 1: Survey (paper copy – note electronic copy has identical content)

Institution ID #: _____
(for office use only)

Palliative medicine competency training in emergency medicine residency programs: A survey of residency education leaders

This is a survey being conducted by researchers in Emergency Medicine and Hospice and Palliative Care at the Johns Hopkins Bloomberg School of Public Health and the Lehigh Valley Health Network Department of Emergency Medicine. The purpose of this survey is to provide a needs assessment of hospice and palliative medicine (HPM) competencies in EM residency training. The survey should take you at most 10 minutes to complete. The research is grant-funded by the Emergency Medicine Foundation (EMF)/Emergency Medicine Residents' Association (EMRA) Resident Research Grant, the Dorothy Rider Pool Healthcare Trust, and the PCOM^{MedNet}. This research is being conducted in part to satisfy the thesis requirement for our EM resident researcher (Dr. Kraus) to complete a Doctor of Public Health degree at the Johns Hopkins Bloomberg School of Public Health. We need as many EM faculty to complete the survey as possible. Your completion of the survey serves as your consent to be a study subject. Please contact Chadd K. Kraus, DO, MPH, at hpm.emed@gmail.com with any questions or concerns regarding this study. Note that at the end of the survey, you will have an opportunity to free-text a general response to this survey. Individual responses to the survey will be kept anonymous.

Please complete the survey and return in the self-addressed stamped envelope provided.

IMPORTANT: IF YOU HAVE COMPLETED THIS SURVEY ELECTRONICALLY IN RESPONSE TO A PREVIOUS E-MAIL ABOUT THIS SURVEY, PLEASE CHECK THIS BOX and RETURN THIS SURVEY BLANK.

☐

IMPORTANT: IF YOU DO NOT WISH TO COMPLETE THIS SURVEY, PLEASE CHECK THIS BOX and RETURN THIS SURVEY BLANK.

☐

Questions:

1. How important is it to include hospice and palliative medicine (HPM) competencies in EM residency training curricula? (Check the box below the applicable selection.)

0	1	2	3	4	5	6	7	8	9	10
⚬	⚬	⚬	⚬	⚬	⚬	⚬	⚬	⚬	⚬	⚬
Very Unimportant					Neutral					Very Important

2. Do you currently teach HPM competencies in your residency?
   - ⚬ Yes
   - ⚬ No
   - ⚬ Prefer not to answer

   Other: _____

3. How is this training delivered? (Select all that apply.)
   - ⚬ Case-based simulation
   - ⚬ Didactics (e.g., seminars, lectures, or case conferences)
   - ⚬ On-line self- directed modules
   - ⚬ Reading list
   - ⚬ Bedside teaching
   - ⚬ Standardized patient encounters
   - ⚬ Rotation in HPM
   - ⚬ Mentoring from HPM faculty
   - ⚬ Prefer not to answer

   Other: _____

4. In your opinion, what is/would be the effectiveness of the following methods for providing education in HPM competencies to the residents in your program?

	Very Ineffective	Somewhat Ineffective	Neutral	Somewhat Effective	Very Effective	Prefer Not to Answer

Case-based simulation	⚬	⚬	⚬	⚬	⚬	⚬
Didactics (e.g. seminars, lectures, case conferences)	⚬	⚬	⚬	⚬	⚬	⚬
On-line self-directed modules	⚬	⚬	⚬	⚬	⚬	⚬
Reading list	⚬	⚬	⚬	⚬	⚬	⚬
Bedside teaching	⚬	⚬	⚬	⚬	⚬	⚬
Standardized patient encounters	⚬	⚬	⚬	⚬	⚬	⚬
Rotation in HPM	⚬	⚬	⚬	⚬	⚬	⚬
Mentoring from HPM faculty	⚬	⚬	⚬	⚬	⚬	⚬

Comments: _____

_____

_____

5. Are you familiar with the EPEC-EM training program for HPM competencies?
   - ⚬ Yes
   - ⚬ No
   - ⚬ Prefer not to answer

Other: _____

6. Do you use all or parts of the EPEC-EM curriculum in your residency program?
   - ⚬ Yes, entire curriculum
   - ⚬ Yes, part of curriculum
   - ⚬ No
   - ⚬ Prefer not to answer

   Other: _____

_____

7. Have you attended the EPEC-EM training program?
   - ⚬ Yes
   - ⚬ No

- Prefer not to answer

Other: _____

8. How important is each HPM competency for the senior level (PGY-3 or PGY-4) EM resident?

	Very Unimportant	Somewhat Unimportant	Neutral	Somewhat Important	Very Important	Prefer Not to Answer
Assessment of illness trajectory	-	-	-	-	-	-
Basic formulation of prognosis	-	-	-	-	-	-
Difficult communication/ breaking bad news/ death disclosure	-	-	-	-	-	-
Advance care planning	-	-	-	-	-	-
Family presence during resuscitation	-	-	-	-	-	-
Management of pain and non-pain symptoms	-	-	-	-	-	-
Withdrawal and withholding of non-beneficial interventions	-	-	-	-	-	-
Management of imminently dying	-	-	-	-	-	-
Management of hospice patients and palliative care systems referrals	-	-	-	-	-	-
Ethical and legal issues	-	-	-	-	-	-
Spiritual and cultural competency	-	-	-	-	-	-

Management of the dying child	o	o	o	o	o	o

Comments: _____

_____

_____

9. Indicate the level of skill that your senior EM residents (PGY-3 and PGY-4) have in the following HPM competencies.

	Very Unskilled	Somewhat Unskilled	Neutral	Somewhat Skilled	Very Skilled	Prefer Not to Answer
Assessment of illness trajectory	o	o	o	o	o	o
Basic formulation of prognosis	o	o	o	o	o	o
Difficult communication/ breaking bad news/ death disclosure	o	o	o	o	o	o
Advance care planning	o	o	o	o	o	o
Family presence during resuscitation	o	o	o	o	o	o
Management of pain and non-pain symptoms	o	o	o	o	o	o
Withdrawal and withholding of non-beneficial interventions	o	o	o	o	o	o
Management of imminently dying	o	o	o	o	o	o
Management of hospice patients and palliative care systems referrals	o	o	o	o	o	o
Ethical and legal issues	o	o	o	o	o	o
Spiritual and cultural competency	o	o	o	o	o	o

Management of the dying child	o	o	o	o	o	o

Comments: _____

_____

_____

10. How significant are the following barriers to education in HPM competencies in your residency program?

	Not a barrier at all	Marginal barrier	Neutral	Moderate barrier	Significant barrier	Prefer Not to Answer
Poor or lack of collaboration with HPM consult services	o	o	o	o	o	o
Lack of GME, policies, or other institutional support for HPM education	o	o	o	o	o	o

	Not a barrier at all	Marginal barrier	Neutral	Moderate barrier	Significant barrier	Prefer Not to Answer
Other institutional factors	o	o	o	o	o	o
Lack of HPM experience or expertise among faculty	o	o	o	o	o	o
Lack of faculty interest in HPM	o	o	o	o	o	o
Religious, ethical, or cultural concerns among faculty	o	o	o	o	o	o
Other faculty factors	o	o	o	o	o	o

Lack of resident interest in HPM	⚬	⚬	⚬	⚬	⚬	⚬
Religious, ethical, or cultural concerns among residents	⚬	⚬	⚬	⚬	⚬	⚬

Comments: _____

_____

_____

11. Does your institution sponsor a hospice and palliative medicine (HPM) fellowship program?

- ⚬ Yes
- ⚬ No
- ⚬ Not sure
- ⚬ Prefer not to answer

Other: _____

_____

12. Does your institution have an HPM service available for consultation by the ED?

- ⚬ Yes
- ⚬ No
- ⚬ Not sure
- ⚬ Prefer not to answer

Other: _____

_____

13. Do residents in your program have the opportunity to rotate on a HPM service as a required or elective rotation?

- ⚬ Required rotation
- ⚬ Elective rotation
- ⚬ No opportunity to rotate on HPM service
- ⚬ Prefer not to answer

Other: _____

_____

14. Are any EM faculty (including yourself) in your residency program trained or board-certified in HPM? (Select all that apply.)
- Yes, I am trained
- Yes, I am board-certified
- Yes, other faculty are trained
- Yes, other faculty are board-certified
- No

Other: _____

15. How many EM faculty have formal HPM training? Number: _____
- Prefer not to answer

16. Please indicate the accreditation for your program:
- ACGME (MD)
- AOA (DO)
- Dual ACGME/AOA
- Prefer not to answer

Other: _____

17. Please indicate the state where your program is located. _____
18. Which best describes your program?
- PGY 1-3
- PGY 1-4
- Prefer not to answer

Other: _____

19. How many residents are in your program? _____
20. How many core faculty serve your residency? _____
21. Which setting best describes the primary site of your residency training?
- Urban

- Rural
- Suburban
- Prefer not to answer

Other (Question 21): _____

22. Which of the following best describes the hospital that is the primary site of your EM residency?

- University hospital
- Community hospital
- Public hospital
- Military hospital
- Prefer not to answer

Other: _____

23. Which best describes your title in the residency program?

- Program director
- Associate program director
- Assistant program director
- Prefer not to answer

Other: _____

_____

24. How many years total have you served in your current position? _____

25. What is your gender?

- Male
- Female
- Prefer not to answer

26. Finally, please share any general comments in the box below. Let us know about any novel best practices, tools, protocols, or anything else about the education of EM residents in hospice and palliative medicine competencies.

Thank you for completing this survey! We value your feedback and appreciate your time. If you have any additional questions or concerns, please feel free to contact Dr. Kraus at hpm.emed@gmail.com

Appendix 2: Survey (Web-based Version, Screen Shot of Sample Question)

You are currently **previewing** your survey. All validations and logic are inactive in previews. To submit a response, click **Go to Live Survey.**

Go To Live Survey

Palliative Medicine Competency Training in Emergency Medicine Residency Programs: A Survey of Residency Education Leaders

11%

***In your opinion, what is/would be the effectiveness of the following methods for providing education in HPM competencies to the residents in your program?**

	Very Ineffective	Somewhat Ineffective	Neutral	Somewhat Effective	Very Effective	Prefer not to answer	Comments
*Case-based simulation	○	○	○	○	○	○	
*Didactics (e.g., seminars, lectures, case conferences)	○	○	○	○	○	○	
*On-line self-directed modules	○	○	○	○	○	○	
*Reading list	○	○	○	○	○	○	

	Very Ineffective	Somewhat Ineffective	Neutral	Somewhat Effective	Very Effective	Prefer not to answer	Comments
*Bedside teaching	○	○	○	○	○	○	
*Standardized Patient Encounters	○	○	○	○	○	○	
*Rotation in HPM	○	○	○	○	○	○	
*Mentoring from HPM Faculty	○	○	○	○	○	○	

Appendix 3: Mailed letter to program coordinators

Dear Residency Program Coordinator:

We need your help!

Our research team from the Johns Hopkins Bloomberg School of Public Health (JHSPH) and the Lehigh Valley Health Network (LVHN) is conducting an IRB-approved survey of EM Program Directors, Associate Program Directors, and Assistant Program Directors about hospice and palliative medicine education in EM residencies. The research is grant-funded by the Emergency Medicine Foundation (EMF)/Emergency Medicine Residents' Association (EMRA) Resident Research Grant, the Dorothy Rider Pool Healthcare Trust, and the PCOM^{MedNet}. This research is being conducted in part to satisfy the thesis requirement for our EM resident researcher (Dr. Kraus) to complete a Doctor of Public Health degree at the Johns Hopkins Bloomberg School of Public Health. We need as many EM faculty to complete the survey as possible.

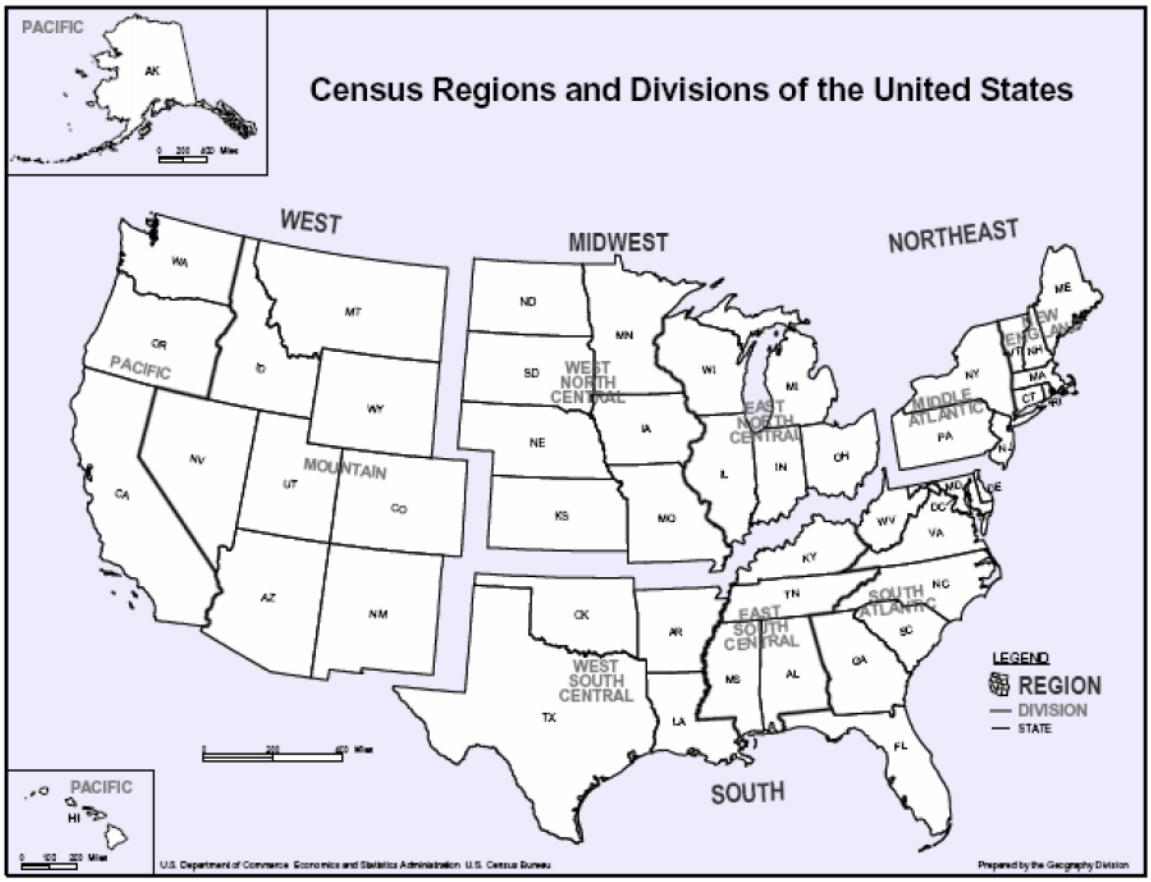
We are asking that you have your Program Director and any Associate/Assistant Program Directors individually complete a copy of the enclosed survey (each should complete a survey). We have included a self-addressed stamped envelope to return the completed surveys. If your faculty members do not wish to participate, please mark "decline participation" on the survey(s) and return in the enclosed envelope. Participation is voluntary and consent is implied by completion of the survey.

Some of your program leadership might have already completed an online version of this survey. If faculty already completed the survey please have them make note of completion on the top of the enclosed survey. The results of the surveys will be kept confidential and individual identifiers will be destroyed following data collection.

In appreciation of any assistance you can provide in the completion and return of the surveys, we have included A $25.00 gift card is also enclosed to thank you for your assistance in ensuring these surveys get completed and returned. Even if your faculty do not participate in this study, please keep the card as a token of our appreciation. Please feel free to E-mail Dr. Kraus at hpm.emed@gmail.com with any questions or concerns regarding this study.

We appreciate your help!

Appendix 4: US Census Regions



Source: http://www.census.gov/geo/maps-data/maps/pdfs/reference/us_regdiv.pdf

Appendix 5: Selected Demographic Characteristics

Variable	ALL (%)	PD (%)	APD (%)	aPD (%)
Gender				
Male	66.2	72.3	59.6	60.5
Female	30.8	25.7	35.1	37.2
Missing	3.0	2.0	5.3	2.3
Program Accreditation				
MD	46.3	42.6	52.6	46.5
DO	14.9	17.8	8.8	16.3
MD+DO	4.5	3.0	7.0	4.6
Missing	34.3	36.6	31.6	32.6
Hospital Location				
Urban	50.2	46.5	52.6	55.8
Suburban	13.9	15.8	14.0	9.3
Rural	2.5	2.0	0.0	7.0
Other	1.5	1.0	3.5	0.0
Missing	31.8	34.6	29.8	27.9
US Region^				
Northeast	3.0	2.0	3.5	4.6
Mid-atlantic	14.4	18.8	12.3	7.0
East North Central	20.4	16.8	15.8	34.9
West North Central	4.4	5.9	3.5	2.3
South Atlantic	8.5	5.0	15.8	7.0
East South Central	3.0	2.0	3.5	4.6
West South Central	5.5	6.0	7.0	2.3
Mountain	1.5	2.0	1.8	0
Pacific	5.5	5.0	5.3	7.0
Missing	33.8	36.6	31.6	30.2
Familiar with EPEC-EM				
Yes	23.9	23.7	19.3	30.2
No	75.6	75.2	80.7	69.8
Missing	0.5	0.1	0.0	0.0

PD = Program Director; APD = Associate Program Director; aPD = Assistant Program Director
Percentages might not equal 100% due to rounding; ^See Appendix 4 for states included in each census region

Appendix 6: Comparison of Paper and Web-based Responses

Variable (only variables with >70% of observations complete are included) (*** = p<0.05)	Paper survey (n=121)	Web-based (n-80)
Gender (% male)	61.9	72.5
Years in position (mean, 95% CI)	5.19 (4.22, 6.15)	6.01 (4.64, 7.39)
Elective rotation available in HPM (% yes) ***	57.5	52.5
Institution Sponsored HPM (% yes)	23.9	32.5
Total residents in program (mean, 95% CI)	36.01 (33.21, 38.92)	39.88 (30.64, 49.11)
Familiar with EPEC-EM (% yes)	23.3	25
Barriers to HPM training (summary) (mean, 95% CI)	2.79 (2.65, 2.93)	2.94 (2.75, 3.13)
Lack of resident interest in HPM	2.98 (2.78, 3.19)	3.11 (2.83, 3.40)
Lack of faculty interest in HPM	3.38 (3.12, 3.56)	3.55 (3.29, 3.81)
Lack of HPM experience/expertise among faculty	3.45 (3.24, 3.66)	3.76 (3.48, 4.04)
Educational Effectiveness Methods, HPM training (summary) (mean, 95%)	3.75 (3.66, 3.85)	3.88 (3.77, 3.99)
Bedside Teaching	4.47 (4.32, 4.62)	4.62 (4.45, 4.79)
Case-based simulation	4.30 (4.14, 4.46)	4.49 (4.32, 4.66)
Mentoring from HPM Faculty	4.02 (3.83, 4.22)	4.23 (4.04, 4.42)
Senior competency HPM Importance (summary) (mean, 95% CI)	4.42 (4.34, 4.51)	4.51 (4.42, 4.60)
Management of pain ***	4.71 (4.60, 4.82)	4.85 (4.77, 4.93)
Crucial Conversations	4.85 (4.77, 4.94)	4.92 (4.85, 4.99)
Management of imminently dying	4.69 (4.57, 4.81)	4.80 (4.69, 4.92)
Senior resident skill (summary) (mean, 95% CI)	3.89 (3.81, 3.99)	3.77 (3.66, 3.89)
Management of pain	4.21 (4.07, 4.35)	4.12 (3.97, 4.26)
Crucial Conversations ***	4.36 (4.24, 4.48)	4.16 (4.01, 4.31)
Management of imminently dying	4.69 (4.58, 4.80)	4.82 (4.73, 4.91)

Appendix 7: Effectiveness of Educational Training Methods for HPM Competencies

Survey Question: "In your opinion, what is/would be the effectiveness of the following methods for providing education in HPM competencies to the residents in your program?"

Educational Method	Total Responses	Mean Likert Score (SD)
Case-based simulation	201	4.37 (0.85)
Didactics	201	3.82 (0.86)
On-line/self-directed	199	3.33 (1.07)
Reading List	200	2.72 (1.02)
Bedside Teaching	196	4.53 (0.81)
Standardized Patient	199	3.96 (0.94)
Rotation in HPM	192	3.61 (1.22)
Mentoring from HPM Faculty	194	4.11 (0.97)

1=very ineffective; 2=somewhat ineffective; 3=neutral; 4=somewhat effective; 5=very effective

Appendix 8: Importance of HPM Competency for Senior Level Resident

Survey Question: "How important is each HPM competency for the senior level (PGY-3 or PGY-4) EM resident?"

Competency	Total Responses	Mean Likert Score (SD)
Assessment of illness trajectory	199	4.39 (0.74)
Basic formulation of prognosis	200	4.36 (0.70)
Difficult communication/breaking bad news/death disclosure	196	4.88 (0.40)
Advance care planning	200	3.96 (0.94)
Family presence during resuscitation	198	4.28 (0.82)
Management of pain and non-pain symptoms	197	4.77 (0.53)
Withdrawal and withholding of non-beneficial interventions	198	4.59 (0.63)
Management of the imminently dying	196	4.74 (0.53)
Management of hospice and palliative care system referrals	197	4.15 (0.87)
Ethical and legal issues	196	4.64 (0.59)
Spiritual and cultural competency	198	4.32 (0.69)
Management of the dying child	192	4.73 (0.60)

1=very unimportant; 2=somewhat unimportant; 3=neutral; 4=somewhat important; 5=very important

Appendix 9: Senior resident skill level in HPM competencies

Survey Question: "Indicate the level of skill that your senior EM residents (PGY-3 or PGY-4) have in the following HPM competencies."

Skill	Total Responses	Mean Likert Score (SD)
Assessment of illness trajectory	196	3.81 (0.80)
Basic formulation of prognosis	196	3.86 (0.86)
Difficult communication/breaking bad news/death disclosure	194	4.28 (0.66)
Advance care planning	197	3.32 (0.93)
Family presence during resuscitation	195	3.90 (0.88)
Management of pain and non-pain symptoms	196	4.17 (0.72)
Withdrawal and withholding of non-beneficial interventions	197	3.69 (0.79)
Management of the imminently dying	196	3.91 (0.88)
Management of hospice and palliative care system referrals	197	3.38 (0.99)
Ethical and legal issues	195	3.80 (0.72)
Spiritual and cultural competency	197	3.57 (0.81)
Management of the dying child	196	3.26 (1.02)

1=very unskilled; 2=somewhat unskilled; 3=neutral; 4=somewhat skilled; 5=very skilled

Appendix 10: Barriers to training EM residents in HPM Competency

Survey Question: "How significant are the following barriers to education in HPM competences in your residency program?"

Barrier	Total Responses	Mean Likert Score (SD)
Poor or lack of collaboration with HPM consult service	199	2.88 (1.36)
Lack of GME, policies, or other institutional support for HPM education	198	2.94 (1.27)
Other institutional factors	196	2.83 (1.12)
Lack of HPM experience or expertise among faculty	199	3.57 (1.21)
Lack of faculty interest in HPM	199	3.42 (1.20)
Religious, ethical, or cultural concerns among faculty	199	2.10 (1.12)
Other faculty factors	191	2.66 (1.07)
Lack of resident interest in HPM	199	3.04 (1.20)
Religious, ethical, or cultural concerns among residents	199	2.20 (1.08)

1=not a barrier at all; 2=marginal barrier; 3=neutral; 4=moderate barrier; 5=significant barrier

Appendix 11: Discrepancies between perceived competency importance and reported senior resident skill level

	COMPETENCY IMPORTANCE		RESIDENT SKILL LEVEL		
	N	Mean Likert Score (SD)	N	Mean Likert Score (SD)	Difference in Mean Likert Scores
Assessment of illness trajectory	199	4.39 (0.74)	196	3.81 (0.80)	0.58
Basic formulation of prognosis	200	4.36 (0.70)	196	3.86 (0.86)	0.50
Difficult communication/breaking bad news/death disclosure	196	4.88 (0.40)	194	4.28 (0.66)	0.60
Advance care planning	200	3.96 (0.94)	197	3.32 (0.93)	0.64
Family presence during resuscitation	198	4.28 (0.82)	195	3.90 (0.88)	0.38
Management of pain and non-pain symptoms	197	4.77 (0.53)	196	4.17 (0.72)	0.60
Withdrawal and withholding of non-beneficial interventions	198	4.59 (0.63)	197	3.69 (0.79)	0.90
Management of the imminently dying	196	4.74 (0.53)	196	3.91 (0.88)	0.83
Management of hospice and palliative care system referrals	197	4.15 (0.87)	197	3.38 (0.99)	0.77
Ethical and legal issues	196	4.64 (0.59)	195	3.80 (0.72)	0.84
Spiritual and cultural competency	198	4.32 (0.69)	197	3.57 (0.81)	0.75
Management of the dying child	192	4.73 (0.60)	196	3.26 (1.02)	1.47

Appendix 12: Qualitative responses in *Four Domains*

Domain One: Barriers (n)

- Time is a factor (6)
- Other things take a priority (2)
- HPM service only available during regular business hours (5)
- HPM service is available for consult (3)
- HPM nursing available for hospice admissions/transfers
- Have faculty with/completing formal HPM training (2)
- Lack of HPM service / consulting service would be great (2)
- Difficulty funding HPM service
- Some other services, private physicians/groups in hospital resistant to HPM consults (2)
- No faculty with interest/training
- Hospital policy for withdrawal of interventions requires 2 physicians

Domain Two: Effectiveness of Educational Methods (n)

- HPM elective available for resident if interested (4)
- At the beside as part of our daily work - We teach these skills as part of the core of what we do in our residency training, although it might not be called HPM (6)
- Online module might work best (2)
- Podcasts are an option
- Need multiple types of learning modules
- Discussions with multidisciplinary panels are effective and good for building relationships
- Bedside teaching/discussions from HPM consults in ED (2)
- Part of Medicine/Hospitalist rotation includes HPM experience
- Simulation for this got positive resident feedback
- Interested in providing more HPM education for our residents
- Make outreach to EM a part of HPM Fellowship training
- If a HPM curriculum/"toolkit" existed, we would incorporate it into our training (2)

- Would like formal lectures that address end-of-life options and patient needs/concerns
- Would be good to have a structured elective for EM residents (2)

Domain Three: Competencies (n)

- These competencies are part of the core communication, interpersonal, professionalism, and system management competencies that we teach
- HPM will become increasingly important issue for EM in setting of aging population (2)
- HPM competencies (e.g. crucial conversations) need to be addressed during residency training
- We (EM) should not leave these decisions to outside services; these decisions and the approach to them should be taught by EM faculty
- HPM should become part of core curriculum/RRC requirement (2)

Domain Four: Skills (n)

- We (EM) haven't done as good of a job as we need to
- Residents generally accept with-holding treatment but are uncomfortable withdrawing it
- Resident will be pursuing next year / alumni has complete HPM fellowship training (4)
- Gain these skills while on ICU/critical care rotations
- Stable end-of-life patients are more challenging cases

Appendix 13: HPM Importance – Unadjusted Analysis

	Mean (95% CI)	p-value
Male		0.0703 (t-test)
Yes	6.82 (6.49, 7.14)	
No	7.35 (6.86, 7.85)	
Familiar with EPEC-EM		0.0009
Yes	7.77 (7.26, 8.28)	
No	6.72 (6.42, 7.03)	
aPD		0.0076
Yes	7.65 (7.06, 8.24)	
No	6.78 (6.47, 7.07)	
HPM Rotation available for EM residents		0.01
Yes	6.60 (6.14, 7.05)	
No	7.29 (6.97, 7.61)	
HPM Consult available for ED		0.02
Yes	6.54 (6.10, 6.99)	
No	7.20 (6.87, 7.54)	
Institutional HPM available		0.30
Yes	7.18 (6.78, 7.59)	
No	6.90 (5.67, 7.24)	

Appendix 14: Teach HPM in EM Residency Program – Unadjusted Analysis

	Teach HPM		
	Yes	No	p-value
Gender			0.278 (Fisher's exact)
Male %	64.9	72.5	
Female %	35.1	27.5	
Years in Current Position (Mean, 95% CI)	5.328 (4.420, 6.235)	5.747 (4.268, 7.226)	0.631
Institutional HPM Service Available			0.871 (Fisher's exact)
Yes %	27.73	25.93	
No %	72.27	74.07	
Assistant PD			0.602 (Fisher's exact)
Yes %	20.51	23.75	
No %	79.49	76.25	
Familiar with EPEC-EM			0.018 (Fisher's exact)
Yes %	29.66	14.81	
No %	70.34	85.19	
Primary Hospital Type			0.191 (χ^2)
Community %	38.46	42.22	
University %	45.05	44.44	
Public %	13.19	8.89	
Military %	0	4.44	
Other %	3.30	0	

Primary Hospital Geography			0.531 (χ^2)
Urban %	78.02	66.67	
Suburban %	16.48	26.67	
Rural %	3.30	4.44	
Other %	2.20	2.22	
HPM Consult Available in ED			<0.001 (χ^2)
Yes %	78.99	46.91	
No %	14.29	32.10	
Not sure	5.88	18.52	
Other	0.84	2.47	
HPM Rotation available for EM Residents			0.0005 (χ^2)
Yes, Elective	66.10	39.51	
Yes, Required	1.69	0	
No	28.81	58.02	
Not sure	3.39	2.47	
Program Accreditation			0.4156 (χ^2)
ACGME (MD)	73.86	62.79	
AOA (DO)	20.45	27.91	
ACGME/AOA Dual	5.68	9.30	
Number of PGY Years in Program			0.3209 (χ^2)
PGY 1-3	56.04	58.14	
PGY 1-4	43.96	39.53	
Other	0	2.33	
Total Residents (Mean, 95% CI)	37.62 (34.09,	34.42 (30.17,	0.2778

	41.14)	38.67)	
Program Location (N=68 missing)			0.0718 (χ^2)
Northeast	5.62	2.27	
Mid-Atlantic	26.97	11.36	
East North Central	30.34	31.82	
West North Central	6.74	6.82	
South Atlantic	12.36	13.64	
East South Central	2.25	9.09	
West South Central	4.49	15.61	
Mountain	1.12	4.55	
Pacific	10.11	4.55	
Barriers Mean Domain Score	3.06 (2.90, 3.22)	2.71 (2.55, 2.86)	0.0024
Lack of HPM experience among EM faculty	3.29 (3.06, 3.52)	3.97 (3.75, 4.20)	<0.0001
Lack of faculty interest in HPM	3.27 (3.04, 3.50)	3.67 (3.44, 3.90)	0.0156
Lack of resident interest in HPM	3.01 (2.78, 3.23)	3.09 (2.83, 3.34)	0.6451
Educational Methods Mean Domain Score	3.86 (3.77, 3.96)	3.73 (3.61, 3.84)	0.0711
Bedside Teaching	4.60 (4.46, 4.75)	4.43 (4.24, 4.62)	0.1422
Case Based Simulation	4.39 (4.23, 4.54)	4.37 (4.18, 4.56)	0.8950
Mentoring from HPM faculty	4.23 (4.06, 4.40)	3.92 (3.69, 4.16)	0.0316
Senior Competency Mean Domain Score	4.53 (4.46, 4.60)	4.35 (4.26, 4.46)	0.0051
Crucial Conversations	4.89 (4.81, 4.96)	4.88 (4.78, 4.96)	0.8411
Management of Pain	4.82 (4.73, 4.91)	4.69 (4.56, 4.82)	0.0891

Management of imminently dying	4.82 (4.73, 4.90)	4.62 (4.46, 4.79)	0.0412
Senior Resident Skill Mean Domain Score	3.97 (3.88, 4.06)	3.67 (3.57, 3.78)	<0.0001
Crucial Conversations	4.37 (4.26, 4.49)	4.15 (3.99, 4.32)	0.0240
Management of Pain	4.27 (4.14, 4.41)	4.02 (3.87, 4.18)	0.0150
Management of imminently dying	4.83 (4.74, 4.91)	4.61 (4.47, 4.75)	0.0097

Appendix 15: Pearson Correlation – HPM Importance

	Pearson Correlation Coefficient	p-value	N observations
Years in position	-0.076	0.29	196
Total Residents	0.258	0.002	137
Barriers Mean Domain Score	-0.142	0.046	199
Lack of HPM experience among EM faculty	-0.045	0.527	199
Lack of faculty interest in HPM	-0.194	0.006	199
Lack of resident interest in HPM	-0.205	0.004	199
Educational Methods Mean Domain Score	0.371	<0.001	201
Bedside Teaching	0.316	<0.001	196
Case Based Simulation	0.178	0.011	201
Mentoring from HPM faculty	0.367	<0.001	194
Senior Competency Mean Domain Score	0.443	<0.001	200
Crucial Conversations	0.226	0.001	198
Management of Pain	0.241	0.001	197
Management of imminently dying	0.134	0.064	192
Senior Resident Skill Mean Domain Score	0.045	0.523	201
Crucial Conversations	-0.032	0.654	194
Management of Pain	0.075	0.917	196
Management of imminently dying	0.339	<0.001	196

Appendix 16: Analysis of Variance (ANOVA) – HPM Importance and Program accreditation

Accreditation	Difference between means	95% CI
ACGME - AOA	0.326	-0.669, 1.321
ACGME – Dual	1.781	0.127, 3.436
AOA – Dual	1.456	-0.345, 3.256

*Dual programs are those accredited by both the ACGME and AOA

Appendix 17: HPM Importance – Linear Regression

	Estimate	**SE**	**P-value**
Intercept	7.7069	0.5302	<0.0001
Male	-0.3106	0.2923	0.2893
Assistant PD	0.7739	0.3253	0.0184
Familiar with EPEC-EM	0.9520	0.3191	0.0032
Barriers – Domain Mean	-0.3209	0.1672	0.0565

Appendix 18: HPM Teaching – Linear and Logistic Regression Analysis

HPM Teaching – Regression (Maximum likelihood estimates)

	Estimate	SE	Wald chi-square	P-value
Intercept	0.0500	0.7871	0.0040	0.9494
Male	-0.3347	0.3621	0.8544	0.3553
Familiar with EPEC-EM	0.7640	0.4119	3.4401	0.0636
ED Consult Available	1.1255	0.3608	9.7310	0.0018
HPM Rotation Available	0.7272	0.3324	4.7868	0.0287
Barriers – Domain Mean	-0.2543	0.2182	1.3585	0.2438

HPM Teaching – Regression (Odds Ratio Estimates)

	Point estimate	95% Wald CI
Male	0.716	0.352, 1.455
Familiar with EPEC-EM	2.147	0.958, 4.813
ED Consult Available	3.082	1.519, 6.250
HPM Rotation Available	2.069	1.089, 3.970
Barriers – Domain Mean	0.775	0.506, 1.189

Appendix 19: Curriculum Vitae

CONTACT INFORMATION

443-722-9625 / chaddkraus@gmail.com

EDUCATION AND TRAINING

Residency - Emergency Medicine 06/2010 – 06/2014
Lehigh Valley Health Network (LVHN) / Bethlehem and Allentown, PA

Emergency Department Directors' Academy (EDDA) 02/2013 – 06/2014
American College of Emergency Physicians (ACEP) / Dallas, TX

Doctor of Osteopathic Medicine (D.O.) 08/2005 – 06/2010
Philadelphia College of Osteopathic Medicine (PCOM) / Philadelphia, PA

Doctor of Public Health (DrPH) 01/2006 – 05/2014
Healthcare Leadership and Management
Johns Hopkins Bloomberg School of Public Health (JHBSPH) / Baltimore, MD
Dissertation Topic: Palliative Medicine Competency Training in EM Residency

Master of Public Health (MPH) 06/2004 – 05/2005
Health Policy and Management (certificate in Health & Human Rights)
Johns Hopkins Bloomberg School of Public Health (JHBSPH) / Baltimore, MD

Master of Public Health Coursework 08/2003 – 12/2003
Drexel University, School of Public Health / Philadelphia, PA

The Graduate Training Program in Clinical Investigation 06/2002 – 06/2003

The Science of Clinical Investigation,
Johns Hopkins Schools of Medicine and Public Health / Baltimore, MD

Post-baccalaureate pre-medical coursework (non-degree)

Loyola College in Maryland / Baltimore, MD	08/2001 – 05/2002
Case Western Reserve University / Cleveland, OH	05/2001 – 08/2001
Pennsylvania State University / University Park, PA	01/2001 – 05/2001

Bachelor of Arts (BA), Political Science (top graduate in major) 08/1998 – 12/2000
Double Minor in Classics and Catholic Studies
Loyola College in Maryland / Baltimore, MD

Undergraduate Coursework 08/1996 – 05/1998
Case Western Reserve University / Cleveland, OH

LICENSES AND CERTIFICATIONS

Commonwealth of Pennsylvania, Osteopathic Physician & Surgeon	expiration 2014
U.S. Department of Justice, Drug Enforcement Agency (DEA)	expiration 2014
Advanced Trauma Life Support (ATLS)	expiration 2015
Advanced Cardiac Life Support (ACLS)	expiration 2014
Pediatric Advanced Life Support (PALS)	expiration 2014
American Heart Association (AHA) Instructor – ACLS	expiration 2015
American Heart Association (AHA) Instructor – PALS	expiration 2015

BOARD CERTIFICATIONS

Certified in Public Health (CPH), National Board of Public Health Examiners initial 2014

CLINICAL APPOINTMENTS

Medical Staff Physician, Emergency Department

Elk Regional Health System, Saint Marys, PA	06/2013 – present
Sacred Heart Hospital, Allentown, PA	08/2013 – 03/2015
Blue Mountain Health System, Lehighton, PA	09/2013 – 09/2014
Lehigh Valley Health Network, Allentown, PA	10/2013 – 06/2014

EMS, Resident Medical Director 06/2012 – 06/2014

Lehigh Valley International Airport EMS (Lehigh County, Pennsylvania)
Trappe Fire and EMS (Montgomery County, Pennsylvania)
Upper Perkiomen Valley Ambulance (Montgomery County, Pennsylvania)
Bally EMS (Berks County, Pennsylvania)

ADMINISTRATIVE AND LEADERSHIP APPOINTMENTS

American College of Emergency Physicians (ACEP)

Member, Cost-Effective Care Task Force and Delphi Panel (Choosing Wisely Campaign)

Appointed by ACEP President, David Seaberg, MD	10/2011 – present

Section Member

Quality Improvement and Patient Safety (QIPS)	11/2012 – present
QIPS Leadership Group	11/2012 – present
Palliative Care	07/2012 – present
Research	10/2011 – present
Rural Emergency Medicine	10/2011 – present

ACEP Committee Member

Academic Affairs Committee	10/2011 -10/2013
Ethics Committee	10/2013 – present

ADMINISTRATIVE AND LEADERSHIP APPOINTMENTS (continued)

ACEP Committee Member
State Legislative/Regulatory Committee 10/2013 – present

Chair, Sub-Committee for ACEP Ethics Compendium Review and Revision
10/2013 – present

Member, Model of the Practice of Clinical Emergency Medicine Task Force
American Board of Emergency Medicine 01/2013-01/2014

Board of Directors, Emergency Medicine Residents' Association (EMRA) 10/2011-10/2013
Academic Affairs Representative 10/2011-10/2013
Board Liaison to Council of Residency Directors (CORD)
Board Liaison to EMRA Education Committee
Board Liaison to Medical Student Governing Council

Co-Chair Task Force, *24/7/365: The Evolution of Emergency Medicine* Film
10/2011-10/2013
Councilor, ACEP Council on behalf of Pennsylvania ACEP 10/2012

Alternate Councilor, ACEP Council on behalf of Pennsylvania ACEP 10/2013
Co-Chair, Young Physicians Committee Pennsylvania ACEP 11/2013 - present

Fellow, Leadership Development Program
PaACEP (Selected by Board of Directors) 03/2014-03/2015

Committee Member, EMRA
Education Committee 10/2011-10/2013
Critical Care Committee 05/2008-05/2010
Health Policy 10/2011-10/2013
Member, Joint Milestones Task Force 10/2012-10/2013
Reference Committee of EMRA Rep Council 10/2011

LVHN Program Representative to EMRA Rep Council 08/2010-06/2012
Editor, Medical Student Governing Council (Board of Directors) 05/2008-05/2010

Board of Directors, Alpha Sigma Nu (ASN) (National Jesuit Honor Society) 10/2000-10/2009
Vice President of the Board 10/2006-10/2009
Nominations Committee Chairman 10/2003-10/2009
Bylaws Committee 10/2006-10/2009

Founding President, Baltimore Area Alumni Club, ASN 08/2003-05/2008

ACADEMIC AND TEACHING APPOINTMENTS

ACGME CLER (Clinical Learning Environment Review) LVHN Site Visit 02/18/2014
Resident Representative

Abstract Peer Reviewer
Society for Academic Emergency Medicine Annual Meeting 05/2013, 05/2014
Council of Residency Directors in EM Academic Assembly 03/2013, 03/2014

Manuscript Peer Reviewer
Annals of Emergency Medicine 10/2012 – present
Western Journal of Emergency Medicine 05/2012 – present

Co-Chair, Resident Track CORD Academic Assembly 03/2012-03/2014

Course Faculty, Central Line Course
Lehigh Valley Health Network, Division of Education 07/2011, 06/2013

Member, Medical School Admissions Committee
Philadelphia College of Osteopathic Medicine 08/2008-05/2010

Head Graduate Teaching Assistant, Johns Hopkins Bloomberg School of Public Health
Environmental & Occupational Health Law & Policy (180.628) 01/2010-05/2010
Problem Solving in Public Health (550.608) 01/2006-01/2008
Alcohol & Health (301.657) 01/2006-05/2006

Member, Council on Education for Public Health (CEPH) 09/2003
Accreditation Self-Study Committee
Drexel School of Public Health (Appointed by Dean, Marla Gold, MD)
Small Group Facilitator, "Workforce Issues" Roundtable Discussion 05/2012
Resident and Young Physician Section at *ACEP Leadership and Advocacy Conference*, Washington, DC

Small Group Facilitator, Palliative Medicine in EM Conference 9/25/2013
New York City/New York University Department of Emergency Medicine

RESEARCH GRANT FUNDING

Principal Investigator ($5,000) Emergency Medicine Foundation (EMF)/Emergency Medicine Residents' Association (EMRA) Resident Research Grant
"Palliative medicine competency training in emergency medicine residency programs:
A survey of emergency medicine residency education leaders" 07/2013 – 07/2014

RESEARCH GRANT FUNDING (continued)

Principal Investigator ($25,000) Dorothy Rider Pool Health Care Trust
"Palliative medicine competency training in emergency medicine residency programs:

A survey of emergency medicine residency education leaders" 06/2012 – 06/2014

Emergency Medicine Foundation Medical Student Research Grant ($2,400) EMF and Society for Academic Emergency (SAEM)
"HIV in the Emergency Department at the Johns Hopkins Hospital: A 20-year review"
Faculty PI: Gabor D. Kelen, MD 06/2007 – 10/2008

Research Scholar, National Center for the Study of Preparedness and Catastrophic Event Response (PACER), Johns Hopkins University, a US Department of Homeland Security (DHS) Center of Excellence 06/2007 – 09/2007

Project Manager/Clinical Research Coordinator ($911,199 - AHRQ #1 U01 HS014353 01) PI: Gabor D. Kelen, MD
"Discharge Criteria for the Creation of Hospital Surge Capacity" 01/2004 – 10/2007

Project Manager/Clinical Research Coordinator (Department-Funded Johns Hopkins EM) PI: Gabor D. Kelen, MD
"Sero-prevalence of Undetected Blood-borne Infections in Emergency Department Patients" 05/2003 – 01/2004

Site Manager/Clinical Research Coordinator ($3,994,843 - NIH #1RO1 HD39633-01) PI: Richard E. Rothman, MD, PhD "Transmissibility of Gonorrhea (GC) and Chlamydia (Ct) using Nucleic Acid Amplification Tests (NAAT)" 06/2002 – 05/2003

PROFESSIONAL AND SCHOLARLY SOCIETIES

American College of Emergency Physicians (ACEP) 2007 – present
Emergency Medicine Residents' Association (EMRA) 2007 – present
Pennsylvania Chapter, ACEP (PaACEP) 2007 – present
Society for Academic Emergency Medicine (SAEM) 2005 – present
American College of Osteopathic Emergency Physicians (ACOEP) 2010 – present

American College of Physician Executives (ACPE)	2012 – present
American College of Healthcare Executives (ACHE)	2013 – present
Pi Sigma Alpha, Political Science Honor Society	selected 05/1999
Eta Sigma Pi, Honor Society of Students in Latin and Gree	selected 05/1999

LECTURES AND PRESENTATIONS

Media Engagements

1. "Physicians in U.S. Congress" (invited guest), NPR affiliate, KCSN (Northridge, California). November 4, 2004

2. "Physicians in Congress" (invited guest) National Public Radio's (NPR) "Talk of the Nation: Science Friday with Ira Flatow" (radio broadcast to 240 NPR-affiliates across the United States). November 5. 2004.

3. Featured in American College of Emergency Physicians (ACEP) Leadership and Advocacy Conference Promotional Video. January – May 2013.

International Lectures

1. "Reverse Triage: Criteria for Immediate Inpatient Disposition for Creation of Surge Capacity." Oral Research Forum.14th World Congress of Disaster Medicine (WCDEM). Edinburgh, Scotland. May 2005.

U.S. Lectures

1. "Twenty-years experience with HIV testing among emergency department patients at the Johns Hopkins Hospital." State-of-the-Art Research Presentation. ACEP Scientific Assembly. Chicago, Illinois. October 2008.

2. "Resident as Teacher." Council of Residency Directors in Emergency Medicine (CORD) Academic Assembly, Resident Track. Atlanta, Georgia. March 2012.

3. "Top Ten Concerns: The Transition to Life as an Attending." OhioACEP Emergency Medicine Assembly, Columbus, Ohio. June 4, 2013. (invited faculty panelist)

4. "Gender Differences in Perceptions and Self-Reported Driving Behaviors Among Teenagers." [Lightning oral] Presented at:
   Society for Academic Emergency Medicine (SAEM), Mid-Atlantic Regional Meeting, Philadelphia, Pennsylvania (Thomas Jefferson University). January 22, 2014.
   Society for Academic Emergency Medicine (SAEM), National Meeting, Dallas, TX. May 17, 2014.
   (Accepted for presentation, not presented due to scheduling conflicts, at SAEM Western Regional Meeting, University of California-Irvine, March 14-15, 2014 and SAEM New England Regional Meeting, New Haven, CT. March 26, 2014)

5. "Palliative Medicine Competency Education in Emergency Medicine: A Survey of Emergency Medicine Education Leaders." PaACEP Spivey Research Competition. Harrisburg, PA. April 8, 2014

Institutional Lectures

1. "Reverse Triage: Criteria for Immediate Inpatient Disposition for Creation of Surge Capacity." Research Lecture. Johns Hopkins Department of Emergency Medicine Annual Research Day. Baltimore, Maryland. May 2005.

2. "Trends in HIV infection in the ED: a 16 year review." Johns Hopkins Department of Emergency Medicine Annual Research Day. Baltimore, Maryland. May 2006.

3. "Vertebral Artery Dissection." Clinical Pathological Conference (CPC). Lehigh Valley Health Network, Department of Emergency Medicine. Bethlehem, Pennsylvania. November 2011.

4. "Diseases of the Premature Infant." Grand Rounds, Lehigh Valley Health Network, Department of Emergency Medicine. Bethlehem, Pennsylvania. March 28, 2013.

5. "DNR and POLST." George E. Moerkirk Emergency Medicine Institute, EMS Continuing Education Lecture. Allentown, Pennsylvania. April 16, 2013.

6. "Resident as teacher." (co-presenter with Amy Smith, PhD) Grand Rounds, Lehigh Valley Health Network, Department of Emergency Medicine June 27, 2013.

7. "Crush Injuries: Out-of-hospital management and review of the Route 309 Tractor-Trailer Crash." (Delivered to approximately 50 EMS providers, first responders, emergency medicine and trauma physicians and nurses). Lehigh Valley Health Network. Allentown, PA. March 20, 2014.

8. "Community-Acquired Pneumonia for the Emergency Physician." Grand Rounds, Lehigh Valley Health Network, Department of Emergency Medicine. Bethlehem, PA. March 13, 2014.

PUBLICATIONS

Peer-Reviewed

1. Suarez TA, Baerwald JP, **Kraus C**. Central Venous Access: A study comparing internal jugular area across approach, position, and head rotation. *Anesthesia and Analgesia*. 2002;95(6):1519-1524.

2. **Kraus CK**, Suarez TA. Is there a doctor in the House?...or the Senate? Physicians in U.S. Congress, 1960-2004. *JAMA*. 2004;292(17):2125-2129.

3. Kelen GD, **Kraus CK**, McCarthy ML, Bass E, Hsu EB, Li G, Scheulen JJ, Shahan JB, Brill JD, Green GB. Inpatient disposition classification for the creation of hospital surge capacity: a multiphase study. *Lancet*. 2006;368(9551):1984-90.

4. **Kraus CK**, Li G. Pilot alcohol violations reported in U.S. newspapers, 1990-2006. *Aviat Space Environ Med*. 2006;77;1288-1290.

9. **Kraus CK**, Levy F, Kelen GD. Lifeboat Ethics: Considerations in the Discharge of Inpatients for the Creation of Hospital Surge Capacity. *Disaster Med Public Health Prep*. 2007;1(1):51-56.

10. Laeyendecker O, Rothman RE, Henson C, Horne BJ, Ketlogetswe KS, **Kraus CK**, Shahan J, Kelen GD, Quinn TC. The Effect of Viral Suppression on Cross Sectional Incidence Testing in the Johns Hopkins Hospital Emergency Department. *J Acquir Immune Defic Syndr*. 2008;48(2):211-215.

7. Tang N, **Kraus CK**, Brill JD, Shahan JB, Ness C, Scheulen JJ. Hospital-Based Event Medical Support for the Baltimore Marathon, 2002-2005. *Prehosp Emerg Care*. 2008;12(3):320-26.

8. Kelen GD, McCarthy ML, **Kraus CK**, Ding R, Hsu EB, Li G, Shahan JB, Scheulen JJ, Green GB. Creation of surge capacity by early discharge of hospitalized patients at low risk for untoward events. *Disaster Med Public Health Prep*. 2009;3(2 Suppl):S10-16.

9. **Kraus CK**, Guth T, Richardson D, Kane BG, Marco CA. Ethical Considerations in Education Research in Emergency Medicine (2012 SAEM Consensus Conference on Education Research in Emergency Medicine). *Acad Emerg Med*. 2012;19(12):1328-32.

11. Counselman FL, Borenstein MA, Chisholm CD, Epter ML, Khandelwal S, **Kraus CK**, Luber SD, Marco CA, Promes SB, Schmitz G. The 2013 Model of the Clinical Practice of Emergency Medicine. *Acad Emerg Med*. 2014 (in press)

10. **Kraus CK**, Katz KD. Extensive facial hematoma following third molar removal. *Am J Emerg Med*. 2014 (in press)

Book Chapters and Contributions

1. **Kraus CK**. Small Group Learning. In: Guth TA (ed). *Resident as Educator*. 1st Edition. Emergency Medicine Residents' Association (EMRA): Irving, TX; 2013:19-22.

2. **Kraus CK**, Ventura E. Physician Shortages and Workforce Issues. In: Schlicher NR, Haddock A (eds). *Emergency Medicine Advocacy Handbook, 3rd Edition*. Emergency Medicine Residents' Association (EMRA): Irving, TX; 2013:85-90.

3. PaACEP EM Board Review Question and Answer Book, 4th Edition Editor JB Leiser, WA Schrading. 2014.

Reflection Papers

1. **Kraus CK**. A Teacher in Pain. *Fam Med*. 2010 Apr;42(4):243-4.

Letters to the Editor

1. **Kraus CK**. Mortgaging our future, foreclosing our profession. *J Am Osteopath Assoc*. 2008 May;108(5):231-3. [Letter]

Other Publications

1. Rothman RE, **Kraus CK**. Emergency Medicine on the Front Lines of Homeland Security. Society for Academic Emergency Medicine (SAEM) Newsletter. November/December 2002.

2. **Kraus CK.** Be Aware of Student Loan Flux. *EM Resident*. August/September 2008;35(4):18-19.

3. **Kraus CK.** Clinical Pearl: Abdominal Pain in the Elderly Patient. *EM Resident*. October/November 2008;35(5):16-17.

4. **Kraus CK**. Palliative Medicine: A New Frontier in Emergency Medicine. *EM Resident*. February/March 2012. 39(1): 12.

5. **Kraus CK**. Assassins and Saboteurs: The Low-Risk Chest Pain Patient. *EM Resident*. 39(2): April/May 2012: 38-39.

6. **Kraus CK**. The 2012 CORD Academic Assembly: Advancing collaboration in emergency medicine. *EM Resident*. 39(3): June/July 2012: 25.

7. **Kraus CK**. Pulseless…and talking (LVADs in the ED). *EM Resident*. 39(4): August/September 2012: 28-29.

8. **Kraus CK.** Bitten: A snake envenomation primer. *EM Resident*. 39(5): October/November 2012: 28-29.

9. **Kraus CK.** EMRA Update. *Council of Emergency Medicine Residency Directors' (CORD) Newsletter*. Winter 2012. Page 6.

10. **Kraus CK.** Time to get involved in EMRA's educational activities. *EM Resident*. December 2012/January 2013;39(6): 24.

11. **Kraus CK.** Going viral (or not): Intussusception Case Report. *EM Resident.* February/March 2013;40(1):24-25.

12. **Kraus CK**. Case Study: Meet the PRES (Posterior-Reversible Encephalopathy Syndrome Case Report). *EM Resident.* April/May. 2013;40(2):14-15.

13. **Kraus CK**. When Warming is a Warning: Infant and Neonatal Fever. *EM Resident.* August/September. 2013;40(4):35-36.

14. **Kraus CK.** Excellence Defined: A Tribute to Ron Krome, MD. *EM Resident.* October/November. 2013;40(5):14-15.

15. Marco CA, **Kraus C**. Shared Decision Making in Emergency Medicine: Choosing Wisely with your patients, not for your patients. *ACEP NOW*. May 2014: 9-10.

Online Publications

1. **Kraus CK.** "The interview." Medical Student Pearl. Emergency Medicine Residents' Association (EMRA). Available online at: http://www.emra.org/emra_articles.aspx?id=29588 (Member access)

2. **Kraus CK.** "Hot Topics in Emergency Medicine: Issues to know for your interview." Medical Student Pearl. Emergency Medicine Residents' Association (EMRA). Available online at: http://www.emra.org/emra_articles.aspx?id=29518 (Member access)

3. **Kraus CK.** "What's Up in Emergency Medicine." Various topics discussed in monthly e-newsletter distributed to approximately 8,000 members of the Emergency Medicine Residents' Association (EMRA), June 2008 – June 2010

Acknowledgements for Contributions to Peer-Reviewed Publications

1. Rogers SM, Miller WC, Turner CF, et al. Concordance of Chlamydia trachomatis infections within sexual partnerships. *Sex Transm Infect*. 2008;84(1):23-28. (acknowledged for oversight of enrollment of subjects and interviews at the Johns Hopkins Adult Emergency Department)

2. Lyons MS, Lindsell CJ, Haukoos JS, et al. on behalf of the National Emergency Department HIV Testing Consortium. Nomenclature and Definitions for Emergency Department Human Immunodeficiency Virus (HIV) Testing: Report from the 2007 Conference of the National Emergency Department HIV Testing Consortium. *Acad Emerg Med*. 2009;16(2):168-77. (Acknowledged as a scribe for the discussion sections and assisting with compilation of comments provided by Consortium participants.)

Peer-Reviewed Abstracts (presented as posters at scientific meetings)

1. Henson C, Laeyendecker O, **Kraus C**, Horne BJ, Rothman RE, Shahan JB, Kelen GD, Quinn TC. A Fifteen Year Retrospective in Trends in Incidence, Prevalence, and Risk Factors for HIV Infection Among Inner-City Patients Attending The Johns Hopkins Emergency Department from 1988-2003. 11th International Conference on Retrovirus and Opportunities Infections (CROI). Paper #89, Session 18. (San Francisco, California. February 11-14, 2004). Available online at: *http://www.retroconference.org/2004/cd/Abstract/89.htm*.

2. Kelen GD, **Kraus CK,** Brill JD, the CEPAR Research Group. Creation of Hospital Surge Capacity by the Early Discharge of Inpatients *Acad Emerg Med* 2005;12:23a

3. Brill JD, **Kraus CK**, Tang N. Going the Distance: Epidemiology of Participant Injuries and Description of On-Site Medical Services during the Baltimore Marathon, 2002-2004. *Ann Emerg Med* 2005;46(3):S31.

4. Suarez TA, **Kraus CK**. Ascending Aortic Dissection (Type A) with Hemodynamically Significant Cardiac Tamponade in a Previously Hypertensive Pregnant Woman after Acute Cocaine Use: A Case Report and Discussion. In Abstracts of Posters Presented at the International Anesthesia Research Society (IARS) 80th Clinical and Scientific Congress. San Francisco, California, March 24-28, 2006. Supplement to *Anesthesia and Analgesia*. ISSN 0003-2999;102(25) Feb 2006;S48.

5. Kelen GD, **Kraus CK**, and CEPAR Research Group. Creation of Health System Surge Capacity by the Immediate Discharge of Inpatients. *Acad Emerg Med.* 2006;13(5):S94

6. **Kraus CK**, Rothman RE, Shahan JB, Quinn T, Kelen GD. Trends in HIV infection in the ED: a 16 year review. *Acad Emerg Med.* 2006;13(5):S22

7. **Kraus CK**, Shahan JB, Rothman RE, Hsieh Y, Laeyendecker O, Oliver A, Gamiel J, Quinn TC, Kelen GD. Twenty-years experience with HIV testing among emergency department patients at the Johns Hopkins Hospital. *Ann Emerg Med*. 2008;52(4):S41-42.

8. **Kraus CK**, Shahan JB, Rothman RE, Hsieh Y, Laeyendecker O, Oliver A, Gamiel J, Quinn TC, Kelen GD. Seroprevalence of HSV-2 infection among an urban emergency department population. *Ann Emerg Med.* 2008;52(4):S54.

9. **Kraus CK**, Shahan JB, Rothman RE, Hsieh Y, Laeyendecker O, Oliver A, Gamiel J, Quinn TC, Kelen GD. Twenty-years experience with HIV testing among emergency department patients at the Johns Hopkins Hospital. *Proceedings of the 2008 National Summit on HIV Diagnosis, Prevention, and Access to Care*. Hyatt Regency Crystal City (Arlington, Virginia, November 18-21, 2008).

10. Oliver A, Layendecker O, **Kraus C**, Hairston H, Gamiel G, Neal J, Moore R, Rothman R, Shahan J, Kelen G, Quinn T. Trends in HIV Prevalence and Incidence in the Johns Hopkins Hospital Emergency Department. *The Johns Hopkins Urban Health Institute, Baltimore Research Day Program and Abstract Booklet*. May 9, 2008; Poster #19, page 59.

11. Hsieh Y-H, Beck K, Kelen G, Shahan J, **Kraus C**, Laeyendecker O, Quinn T, Rothman R. High Prevalence of Undiagnosed HIV Infection in Patients Who Were Not Offered Screening and Patients Who Declined Screening: Evaluation of a Rapid HIV Screening Program in a U.S. Urban Emergency Department. STI & AIDS World Congress 2013, Vienna, Austria, July 14-17, 2013.

12. Barr GC, Kane KE, Barraco RD, Rayburg T, Dugan L, **Kraus CK**, Greenberg MR. Gender Differences in Perceptions and Self-reported Driving Behaviors among Teenagers. PaACEP14 Spivey Competition, April 8, 2014. Hilton Hotel, Harrisburg PA.

13. **Kraus CK**, Meyers M, Kane BG, Greenberg MR. Palliative medicine competency training in emergency medicine residency training: a preliminary report. 2014 Pennsylvania Osteopathic Medical Association (POMA) 106th Annual Clinical Assembly/Convention. Valley Forge Convention Center, King of Prussia, PA, May 1, 2014.

14. **Kraus CK**, Meyers M, Kane BG, Greenberg MR. Palliative medicine competency training in emergency medicine residency training: a preliminary report. 2014 ACEP Leadership and Advocacy Conference. Omni Shoreham Hotel, Washington, DC, May 18-21, 2014.

Clinical Policies and Other Publications

1. **Kraus CK**, Heidt J. on behalf of the Emergency Medicine Residents' Association. Resolution 22(13), "Graduate Medical Education Funding and the Match Process." Adopted by the 2013 ACEP Council.

2. ED Back-pain Observation Protocol Revision. Lehigh Valley Health Network, Department of Emergency Medicine. May 2014.

HONORS AND AWARDS

John C. Hume Doctoral Award ($2,900) 2010-11
Johns Hopkins School of Public Health (awarded to Health Policy and Management student who shows great potential in the field of public health)

Polyprobe Scholarship ($4,000) 2008-09
Philadelphia College of Osteopathic Medicine (awarded to one medical student for research excellence)

Medal of Excellence - Top Graduate in Political Science Loyola College 05/2001

Invocation Speaker - 149th Commencement Ceremonies, Loyola College 05/2001

Distinguished Essay Award, Loyola College Catholic Studies Program 11/2000

Distinguished Essay Award, Loyola College History Department 11/1999

Men's Varsity Basketball Letterwinner, Case Western Reserve University 1996-98